Liberated Debris

Protest by Making

by

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https://liberateddebris.format.com/

Abstract

Liberated Debris is a series of musical instruments made from discarded objects to explore our relationship with our devices. It's a physical collage of components, materials and parts, put together to reveal new meanings. More specifically, it reveals and protests the decline of making among people, and the domination of manufacturers over all aspects of the technology production industry. This thesis challenges our reliance on manufacturers to fulfill all our technology needs, and aims to inspire the audience and engage them to become active makers. It argues that making can reclaim and redistribute knowledge for its own sake. *Liberated Debris* is an un-disciplined study that embraces all knowledge and all people, regardless of experience and education.

Keywords

Making, Maker Movement, Technology, Right-to-repair, Re-use, Repurpose.

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Forward

Growing up, my grandfather had a great influence on me. He taught me to find value in objects that others might not, and that I can change those objects, open them up, replace or remove parts, and change their functions altogether, for fun or need. Through him, I learned the language of making, to express by making. And through this language, I was able to free myself from being a “user” and position myself as a maker. A rightful owner of my devices. He saw making as an ancient human practice, an instinct almost. Makers, to him were not a special group of people that consider themselves savvy or trendy, we are all makers and we always have been.

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I want to thank my family and friends who supported me, put up with my obsessive working hours and calmed me down when I needed it. Thank you to my dad and my father-in-law, you guys are an inspiration.

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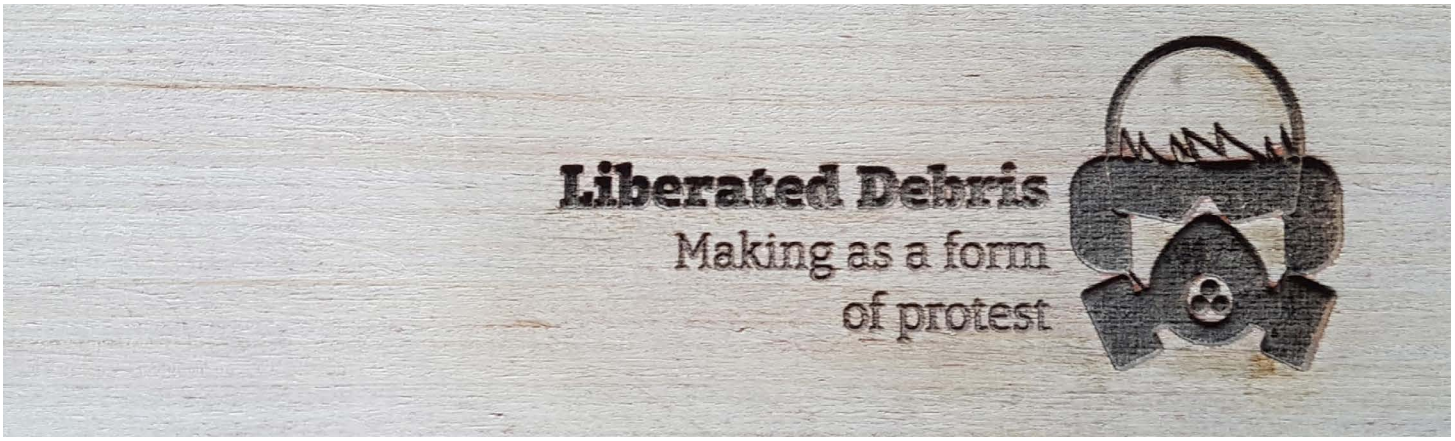
In loving memory of Latif and Mohammad Hijazi.

Initiation



As a Palestinian-Lebanese growing up in Lebanon, my struggle for identity is old and regular. My people, removed from our lands and homes and sought refuge in unwelcoming countries, are continuously resisting the erasure of our identity and history from our cities, our schools, our cultural sites, and so on. Occupied lands to subjugated peoples and confiscated history, countless strategies were all aimed to deny and erase our identity that connects and unites us as people. **Resistance came in many forms and through many points of intervention:** We fought in education, transport, government and healthcare institutions to reflect our identity in legislation, language, curriculum, and media. Our experience with subjugation taught us that the systems of power aim to erase the collective identity, as a tool to weaken and discredit people. It empowered me to see how my active existence, my practice of identity, can be a form of resistance. **The restoration of my identity began with my enforced presence in my everyday interactions and artifacts.**

Today, I am witnessing another form of identity erasure and subjugation. Technology manufacturers have implemented strategies that aim to curb our ability to contribute and be part of the technology creation and function. They have groomed themselves to be the exclusive providers and navigators of technology, with its present and potential uses. As customers, **we are perceived and expected to be "mere users" that use their devices as intended and for a specified period of time.** With patents and copyrights that protect the manufacturers' technology, the distance between us and our devices is continuously growing and with it, valuable knowledge (Hertz). Our rights, as ancient makers, as humans, have been persistently taken away from us by manufacturers, attempting to turn knowledge into a commodity, sold and distributed through complicit institutions. The individuality and unique perspective of each person, as a maker or designer, is replaced by a blanket solution that forces everyone to conform and change. History is rich in testimonies of humans' abilities to identify their needs and develop suitable solutions that fit their unique surroundings and environments.

Making, a basic word that describes countless activities performed by people or animals. Like birds making nests from found materials, humans too have been making things from resources around them since the beginning of history. Makers, throughout time, made homes, tools, food, and clothes for themselves and their communities. They developed knowledge and techniques through their failures and successes. Anyone and everyone in the world, regardless of gender, age, language, background or skills, is a maker, be it active or not. However, after

the publication of *Make Magazine* and the first *Maker Faire*, making shifted its meaning. Makers were perceived by many to be producers of stuff or *kipple*, contribute to waste in the world and complicit in the status-quo of the manufacturing industry. Therefore and for reasons I will discuss later in this paper, I am compelled to draw distinctions from the mainstream *Maker Movement*.

As makers, our creations are an embodiment of our identity. We make based on our experiences, our community, our resources, values, needs, and limitations. Through our objects, one can see what we care about and understand our angle, because our objects address the things we believe are important and oppose the things we find dangerous. Makers, I believe, are from the people, and their creations are a product of that experience and vantage point. The marginalization of makers in the industry is evident in the types of products and devices that surround us in our daily lives. These devices, while existing in our homes, or on our bodies, represent and benefit their manufacturers first and foremost, they are corporate mascots disguised as life-enhancing technologies. They have sleek trendy designs, branded with corporate identities, and void of any human touch, yet, they are comparable in every way. Our identity as makers, each with our unique priorities and styles, has been systematically eroded and is no longer visible in our daily life. And while we observe our rights and identity as makers wear away, manufacturers invest time and money devising strategies to ensure the constant increase in profits, despite the social and environmental consequences. It is a dangerous shortsighted strategy which produces incredible amounts of waste that occupy our fields around the world. **It is time for us to recognize this threat and injustice, and to rise in protest against it.**

To protest is to rise in objection, to dissent against what we cannot immediately prevent. A protest brings the opposition together and unites their voices against a common target. It is a stick in the system's wheels. **A tactic available for the powerless to confront the systems of power.** We can no longer be passively critical of the status-quo, what we need is a position that challenges and resists the way things are, while being the change itself. To protest through making is to create disobedient objects that reclaim and redistribute knowledge for its own sake. To protest the decline of making among people, and the domination of manufacturers over all aspects of the technology production industry.

As a maker I was mentored by my grandfather and taught to experiment and test ideas in order to learn, I was taught not to be afraid of failure because with failure comes knowledge. Making empowered me and allowed me to understand how our devices are made and how they can be used or reused. It is a fluid form of experimentation and an un-disciplined exploration of materials, parts and functions. After learning design, I was exposed to a different form of **production that is based on a set of principles and guidelines, and measured by corporate buzzwords like efficiency, empathy, feasibility or success.** As a trained and experienced designer, I learned to navigate this highly disciplined system of ideation and production, and abide by its guidelines. I learned to avoid orphans, widows, rivers, and to apply colour theories and grid systems, all to ensure the approval of a predetermined structure. As a designer, I rely on psychological theories that predict people's behaviour and perception to develop ideas that address both. Making on other hand, does not abide by limitations or principles, and instead leverages material proficiency, values knowledge creation and applauds dissemination as an intended outcome. Making urges me to re-examine and re-imagine existing objects based on my needs and resources, and to challenge the status-quo by presenting a better way.

Liberated Debris is a project that positions making as a form of protest. **A protest against the hegemony of conglomerates of manufacture and knowledge.** It is an outcome and a response to the maker's removal from

the process of production, the devaluation of the knowledge making can bring, and the exploitation of people and natural resources.

Liberated Debris is a series of musical instruments made from discarded resources that were deemed obsolete by their original owners. It revokes the manufacturers' rights to plan obsolescence, to hide and protect their technologies and it supports the people's rights to hack, repair, modify, make and use their devices as they please. *Liberated Debris* calls for making to be revived, to activate makers, to re-evaluate our resources, and to share knowledge and perspective openly and freely. As a set of experiments with resources taken from everyday devices and available in a common home, *Liberated Debris* is inspired by and a tribute to my grandfather. His mentorship and display of making opened my eyes to the opportunities and significance of making on an individual level. He allowed me to uncover the true value of my devices and encouraged me to learn by breaking and modifying them. *Liberated Debris* is an outcome and an example of my grandfather's teachings shared here to acknowledge the maker's role and value.

As research, *Liberated Debris* is an inquiry to identify, develop and deliver a tactic that takes advantage of making's leverages and utilizes them against the dominion of manufacturers over technology and knowledge. It is a reflection of my personal experience and motivation in making and an un-disciplined methodological approach in celebration and recognition of independent makers throughout history. ***Liberated Debris* urges us to reconsider our relationship with our devices and our cycles of production, purchase and waste.** It aims to present the audience with an alternative way to deal with our existing resources and share the knowledge and tools needed to achieve this outcome. Through this study, I will be attempting to respond to the question of how I can readdress making to inspire others to reuse their existing resources, and with that produce less waste.

Un-disciplined Methodologies

I begin this section with the acknowledgement, that whether directly or indirectly, academia has empowered and abetted the industrial revolution and its manufacturers, and has contributed to the distance between the maker and the user and the loss of knowledge in between. Specifically, academic institutions have adopted a system of attribution that presumes knowledge to be owned and demands it to be corroborated and substantiated (Lander). These institutions help create hierarchies that ensure the centralization of knowledge inside academia and the manufacturing industry, while excluding and disregarding independent thinkers and makers. The outcome of this affair is that people know less about what they need, how to make it or how it works. Instead, they rely solely on established manufacturers and accredited academics to define their knowledge, possibilities, needs, and expectations. Therefore, **I was motivated to un-discipline this study and "make" my own methods that touch upon all of my experiences and knowledge gained through multiple disciplines on one hand, and personal experiences built on my upbringing as a maker, on the other.** By un-disciplining my study, I no longer need to abide by a discipline, its contributors and its methods. I free myself from the burden of acknowledging and supporting systems that aid my marginalization as an independent maker, that contribute to the ongoing subjugation of people around the world, and that commodify and restrict knowledge under layers and layers of academic disciplines. Therefore, while I abstain from providing a grounding for these disciplines, I do however, allow myself access to the tools, methods and techniques that I consider useful regardless of their academic lineage. Making, I believe, through hacking, tinkering, breaking, building offers a unique opportunity to access all technical knowledge, and to manifest that knowledge into individualized solutions.

At the beginning of this journey, I planned to use a mixed methodology which included *Critical Design* and Reflexive Research. Politically charged and socially aware, *Critical Design* aims to "make us think. But also raising awareness, exposing assumptions, provoking action, sparking debate, even entertaining in an intellectual sort of way, like literature or film" (Dunne and Raby). While "*Reflexivity*, in turn, involves a different form of sensitivity and sensibility in research and design, an interest in and commitment to attending to intentions and interpretations, power and accountabilities" (Pihkala and Karasti). Although the two methodologies are complimentary to each other, they do not cover a vital element of this work, which is free making. *Critical Making*, a term coined by Matt Ratto, "invites reflection on the relationship of the maker to the thing produced, reflection on how elements (whether nuts and bolts, bits, and bytes, or breath, blood, flesh, brain, and neurons) work together—in short, consideration and awareness of the mediated and direct experiences of interacting with the material world" (Ratto and Boler). My undisciplined approach shares an emphasis *Critical Making* on the relationship between the maker and the object, and the knowledge created through the process of making. Eventually, I made a conscious decision to remove all academic restrictions from this research and design project by moving away from a mixed methodology and adopting an undisciplined approach. By doing that, I was able to align myself closer to my view on making, knowledge and technology. By directing my project towards the assigned methodologies, I am submitting my liberty as a maker, and merely following recipes for knowledge created and presented by others and currently acknowledged by acadamia.

Instead, **I approached this project in an undisciplined way that ensures access and open-ended goals that adapt and change according to the requirements.** The undisciplined approach, instead of imposing

a pedagogical relationship between the knowledge bearer and the knowledge seeker, positions both parties as equal knowledge generators, each with their own context and paradigm. By unlocking and observing these methodologies, they become like tool sets, interchangeable depending on the goals of the maker. As an analogy, it is similar to using a tool for wood working in plumbing. Can it be done? Can it be useful? And more importantly, at that point, is it a tool for plumbing, or a tool for wood working, or both, or maybe none? I view methodologies in a similar way, instead of defining at the beginning of this project that I will be using tools of wood working or plumbing for this project, I am opening all the tool boxes that I might find useful throughout my project and using them as I see fit throughout the process. Making, in my opinion, is a free and undisciplined activity by its nature. It is fluid enough to allow the maker to tap into any technical knowledge and use it to build their objects.

Besides ensuring an even relationship between knowledge bearer and seeker, my undisciplined methodology **protests and resists loyalty to methodologies that contribute to the current distribution of power and knowledge.** The results of such methodologies, are usually presumed, expected, measured, and fall in line with the status-quo, and with that, cannot protest it. However, *Liberated Debris* is a project of protest, of intervening and challenging the status-quo. Therefore, it demands to be met with drastic methods and techniques that desist and aim to transform the current systems of knowledge and power. Paul Feyerabend, an Austrian philosopher, argues that without breaking or ignoring certain methodological rules, there is no progress. He adds "This liberal practice… is both reasonable and absolutely necessary for the growth of knowledge." In his opinion, methodologies and arguments can hinder progress and the growth of knowledge because they impose an approach which relies on previously discovered and studied topics. In his book, "Against Method", he urges us to introduce, elaborate and defend ad hoc approaches and methodologies that, whether successful or not, produce knowledge nevertheless. Therefore, in order to truly be able to position this study as a protest to the status-quo, I had to create an approach that benefits from previous knowledge yet does not abide by it, even protest it.

For example, by employing techniques from Critical Design, I am able to both benefit from principles that ensures criticality yet does not necessarily support or agree with Dunne's and Raby's philosophies and contributions. Specifically, I have reservations regarding *Critical Design*'s recognition and affirmation of design's role in the production industry, which is passed on from academic rigour. To accept this formula amounts to the justification and capitulation to its agendas and values, which is contradictory to the core of this project. However, while I reject this system of ownership of knowledge, I do acknowledge the effectiveness of some of its tools and techniques, and allow myself to employ them as needed. **In essence, I started applying my approach to making (hacking, tinkering, modifying, and rebuilding), in order to dissect these disciplines and extract the tools and techniques that are beneficial to this project.** That said, while I do not support knowledge ownership and attribution, due to academic restrictions and formalities, I am obliged to provide citations in order to avoid academic plagiarism.

The main goal of *Liberated Debris* is to protest our reliance on manufacturers for our devices, expose the manufacturers' agendas, and inspire others to reuse and repurpose their existing devices by demonstrating viable approaches. **Each of the instruments/prototypes I made as part of this study, was conceived from the resources available at the beginning of the project.** In other words, while design defines the outcome and then sources the material, I, on the other hand, analyze the material and then define the outcome. Through this reversed process, I am building an understanding of materials and planning functionalities according to what is available to me at that time. After collecting resources and identifying a potential prototype, I begin a

rapid prototyping stage which confirms or denies the concept's feasibility. After a proof of concept is built, I then utilize several tools and techniques such as experimentation, makers' tutorials, trial and error, and iterative design process, in order to move forward in the building stage. Eventually, the instruments I develop as part of this study will not aim to solve any problems and propose any new solutions, and should not be measured on that rubric. Instead, my instruments will be evaluated based on their ability to challenge their manufacturers' planned obsolescence and by demonstrating the potential of making in our everyday lives.

Although the generalization of academia's stance towards making might not fairly distinguish between complicit and non-complicit institutions. It does however, reflect the overall alienation of making from academia. There are current efforts in some academic institutions like OCAD University that aim to recognize indigenous knowledge in academia. In fact, several institutions and academics have invested time and effort tin developing decolonization methodologies and practices that help reposition knowledge within academic foundations. The mere existence of these efforts is an indication of the absence of indigenous knowledge within academia, and a sign that people are starting to question and resist colonial strategies. **These steps are crucial in order to recognize and understand knowledge that comes in different material and practice forms than just through the written word, knowledge through making.** While these efforts have not yet transformed the way we view knowledge, it does however lead us to imminent change. More and more we are witnessing the recognition and celebration of indigenous knowledge, not as new knowledge, but as an ancient highly situated knowledge. *Liberated Debris*, through its protest, invites the audience to experience the growth of situated knowledge, simply by making.

Matt Ratto an academic from Toronto, repackaged making to address academia by introducing "critical" to signify its abilities to develop and practice critical thinking (Ratto and Boler). On the other hand, making is also seen as "one of the strongest human impulses and one of the most significant means of human expression" (Charny). While I fully agree with both explanations, I do however consider making to cover the area that encompasses both professional and personal aspects of life. Therefore, making cannot be limited to an academic discourse and ought to be a way of living instead. Through this lens, making becomes accessible to all and not an exclusive position based on qualifications and certifications. **The knowledge and accomplishments achieved by independent makers from all over the world, like my grandfather, should be recognized and acknowledged for the values and knowledge they bring.** So, as a response to the alienation of the maker, this un-disciplined research and design will adopt all of my experiences as a maker, as a child and an adult, be it scholarly-worth or not, towards finding answers and developing solutions for this study.

This approach allows me to address makers as an equal individual and a comrade rather than imposing a pedagogical relationship between my audience and myself. This allows for the equal recognition of my contribution and my audience's after activation, which will in turn inform me and others. Also, this undisciplined approach removes the restraint of establishing academic grounding or historical precedent, and instead permits all possibilities and methodologies – In Paul Feyerabend's words: **"Anything goes"** (Feyerabend). It unlocks both academic and non-academic methodologies, hacks and presents them in a deconstructed view, like a set of tools, which I then select from and utilize in my project. By un-disciplining this project, I get to access all these tools and use them based on their functions and disregarding their inherited context. All the methods, tools and techniques within each discipline becomes available at hand for me, while removing the noise of academic etiquette, which demands historical, attributional and political narrative to be acknowledged. Lastly, this approach can bring to the surface the deep and old issues in industry and academia and it vindicates the maker's

contribution to knowledge and production. It allows the maker to diagnose issues in the way we make things and possibly even arm them with the knowledge of how to fix it based on their own experiences. **Therefore, it supports the independent maker, anywhere in the world, who might or might not have the privilege to receive an academic education.** Makers like my grandfather whose abilities to understand and make objects were not hindered despite their non-academic upbringing.

A Maker's Manifesto

My maker story

Growing up, my grandfather had a great influence on me. I was taught to find value in objects that others might not, I was also taught that I can change those objects, open them up, replace or remove parts, and change their functions altogether, whether for fun or need. I learned the language of making, to express by making. Through this language, I was able to free myself from being a "user" and position myself as a maker. A user today, is a person that receives a product from the manufacturers and uses it as they intend, and without uncovering the full potential of that product. A user, in the manufacturers' eyes, is the perfect customer, because the user accepts the products as intended and for a specified time period by the manufacturers. A maker, as I've learned, is a person who can identify their needs, the resources at hand, and can plan and execute a solution that's driven by

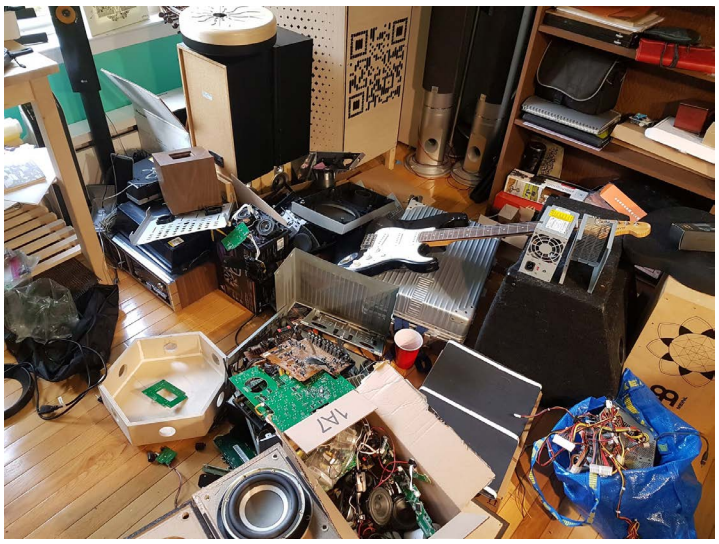


FIGURE 1: Personal collection from donation and collected items

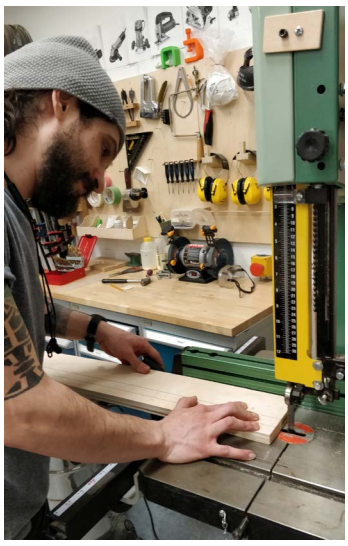


FIGURE 2: Documentation of the making process

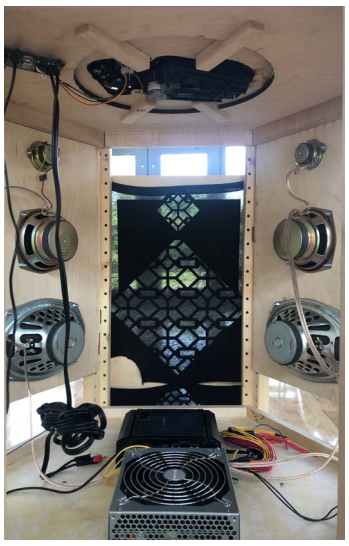


FIGURE 3: A components view of the ID1100

both. **A maker can make, hack, change, combine, remove and tweak their devices to fit their needs and can utilize their devices for a variety of different purposes and for self-defined time periods.** Making does not necessarily entail a physical object, making can produce physical, digital, audible, edible or visual outcomes that reflect the maker's experience and values.

As a maker, I position myself in a central role to the whole process of making. I become the conductor of an orchestra made of components and materials, each with their own special contribution. As a maker, I become aware of their opportunities and costs, of their origins and of their current presence, of their cultural meanings, and of their previous and potential use. My goal then becomes to break them, know them and reassemble them, and by doing that, give them a whole new meaning and purpose. My creations do not aim to be the best at anything, nor the quickest or most efficient, just an alternative way of existing for otherwise discarded things. My experiments, by being, reflect the abundance of usable resources around us, they highlight the bipolar relationship we have with our stuff, how little we know about them, and they protest their unfair abandonment for newer versions. My work tells several stories, my story, which is an outcome of my background

and experiences, and embedded in every decision and part. It also tells the components' stories, which they bring along from their previous existence and into their new one. My objects come from waste, but before that, they were in our computers, stereos and closets, interacting with us daily. They've witnessed our mental rollercoasters, helped us uncover or express our emotions and thoughts, and they endured their obsolescence and our disposal. **My objects are an outcome of an unsustainable system that forsakes its objects on a regular and increasing rate and without repercussion or resolution.** Through making, my experiments allow me to identify and challenge key points in our relationship with our devices and their manufacturers.

Making is not just art, nor it is just science, making is living. It is like writing, used to express, or teach, or learn, or operate, it changes the way we think. In this structure, the maker has a moral responsibility towards their made objects and cannot disregard their implications for the sake of personal gain. As a maker, I have a unique perspective that constantly alludes major manufacturers, it is a result of my experience with their products and my ability to see their impacts on me, personally, my community, and my environment. While manufacturers are driven by financial goals to produce and deliver their products, I, like all people, get to enjoy, and endure,

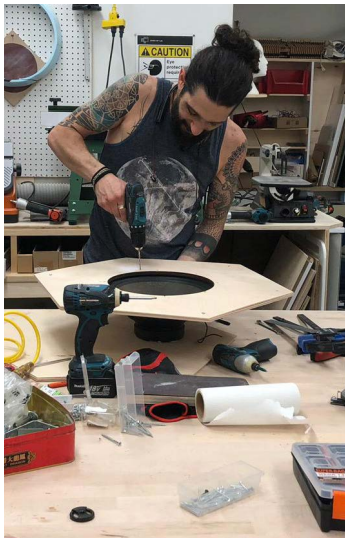


FIGURE 4: Documentation of the making process

FIGURE 5: Some items discarded at E-waste recycling center

	Item Name	Type of Device	Working? (Y/
1	LG Home Theatre	5.1 HomeTheatre	Y
1.1	3" Speakers x 3	Speaker	Y
1.2	7" Subwoofer	Subwoofer	Y
2	Kenwood Stereo Receiver	Audio Receiver	Y
3	Kenwood Stereo Visualizer	Visualizer	Y
4	Numark Mixer	Mixer	Y
5	Rayovac light box	Other	N
6	Altec Lansing - iMT620	Portable Speaker	Y
7	Laney Bass Amp	Bass Amp	Y
7.1	Bass Amplifier	Amplifier	Y
7.2	12" Subwoofer	Subwoofer	Y
8	... Guitar Amp	Guitar Amp	Y
8.1	Guitar Amp	Amplifier	Y
8.2	4.5" Speaker	Speaker	Y
9	Sony HomeTheatre	7.1 HomeTheatre	Y
9.1	DVD Player	Audio/Visual Receiver	Y
9.2	3" Speakers x ?	Speakers	Y
9.3	7" Subwoofer	Subwoofer	Y
10	Sony Stereo Speakers x 2	Speakers	Y
11	JBL Stereo Speakers x 2	Speakers	Y

FIGURE 6: A catalog of collected, donated and found resources

what those products entail. This affair allows me to evaluate objects and devices on rubrics that are different than the ones used by manufacturers and the industry. While designers, engineers and inventors provide the manufacturers with unprecedented opportunities, we, the people on the other hand, get to pay the full price, be it health-related, social or environmental. Therefore, the maker has the opportunity of identifying the problems in this system and responding to them. My grandfather always repeated to me that the ever-changing needs of humans and the environment demand to be met with adaptable solutions that accept change as a fact-of-life from conception. Making opens the adaptability of our objects, it empowers us to diagnose their issues and perform the appropriate solutions, be it a fix or a rebuild. Making is the ability to create something new from existing resources, to function or enhance or express or communicate. It is about creating and sharing, for the sake educating and empowering the people. It is an inclusive collaborative activity that promotes experimentation and knowledge sharing. **Making challenges our understanding of ownership of devices and reveals the manufacturers' control over daily lives.**

Besides knowledge creation and dissemination, making is about identity. When I make things, I embed a little of myself in what I make. **Through my objects, I reflect my values and and my positions, I reflect my resources, my knowledge, my abilities and limitations.** However, while most people rely on manufactured products for their daily activities, we no longer see the maker's identity around us. It is replaced with corporate entities, with their values and brands that deceive the human mind with tools like color theory and creative writing. The absence of our maker identity in our daily interactions is a dangerous phenomenon with long-lasting implications. It strengthens and expands our reliance on technology manufacturers and places us in a position vulnerable to their control and susceptible to their strategies.

My grandfather, the maker

My grandfather, Latif Hijazi, is a Colombian-born, Lebanon-raised maker, who spent most of his life learning and teaching everything he sees important. As a child, my grandfather experienced famine, poverty and occupation.


النهار

ليلة الجمعة تسفر عن كارثة: ١٣٠ ضحية و٢٥ مليون ليرة

FIGURE 7: 1956 Frontpage of "al-Nahar" newspaper

FIGURE 8: Latif Hijazi with family members

Growing up, he lived through a devastating earthquake, multiple wars and a crippling injury. His experiences taught him to value life and everything in it, nature, objects, community, and health. He learned to rebuild and to re-appropriate resources as a response to changing times and crucial needs. Lebanon is a country that relies heavily on outside manufacturers to meet its needs, however, making flourished there on the remnants and carcases of imported devices. Many people in Lebanon could not afford to keep up with technology and so relied on their own skills and knowledge to delay their devices' obsolescence. My grandfather was from a generation that experimented, failed, succeeded and survived countless attempts of improving and making things. He lived through times that proved to him the value of a maker, an active member of society, that is able to find solutions and share them for the betterment of everyone around. He continued to be a maker throughout his life, he taught us to see the real value of our objects and tools, besides being a commodity. He activated us as makers by being a free maker himself, encouraging and mentoring us throughout our lives. Making, as he delivered it, is a way of living, an everyday activity that does not serve one purpose, or one solution, if any.

My grandfather saw the independence that comes with this way-of-living, it empowered him to see his role within his world and value himself and his knowledge. His relentless reminders warned us that active making keeps an ancient human practice alive, which would otherwise be lost and replaced. It's true, he did not have the financial ability to purchase everything he needed, and perhaps desperation was his mother of invention, but he strongly believed that by quitting and buying, knowledge is lost from us and that is far more significant. He believed that our nature is not in purchasing countless products from ever-growing corporations, but by the act of learning how those products work and attempting to make our own. He embodied this mentality everyday, whether by attempting to make simple or complex devices, or by purchasing things based on their reuse and durability factors. He could envision and plan how these products would fit into his life at the time and at their end-of-life periods. **His devices and creations lived to serve much, much longer than planned and performed functions unintended by their manufacturers.**

As an active, free maker, my grandfather gave me the tools I needed to exercise my rights and pursue the knowledge and empowerment that comes with it. He understood the temptation to concede this ability to manufacturers and rely on their immense capabilities to make life-changing devices. However, he also saw the greed that drives those manufacturers to mislead people and misuse resources, all for the sake of their shareholders' pockets and at the expense of social and environmental implications. **His daily life was in and by itself a protest against the hegemony of manufacturers over people's lives and the planet, and he shared his philosophies and knowledge with his friends and family.** Without any formal education or training in technology or making, he explored and experimented with his materials and resources, and created objects that fit in the world peacefully and gracefully. He was able to produce and share knowledge and perspective without any academic certification or acknowledgement. His education came from real-life experiences and experiments, that whether succeeded or not, cultivated knowledge nevertheless. My grandfather taught me that our tools and devices are meant to grow and adapt with us, constant work-in-progress projects that reflect their makers and their nature throughout their existence. His views highlight today's short-sighted processes and products that feed off temporary trends and misleading marketing schemes to convince people to purchase more stuff with no consideration of the waste left behind. Our world is literally full of discarded resources that can be utilized with the right knowledge. His wisdom as a maker opened my eyes to the corner that industry is backing us humans into, and he demonstrated to me that making has an ethical grounding that could liberate us from the perceptual confinement that technology has imposed on us.

Making, *Techne* & Technology

From the first tool ever made by our ancestors to the most complex machine made today, humans have always made things. Our ability to use our cognitive skills in analyzing problems, envisioning solutions and building those solutions, was a human trait that helped our species endure unimaginable circumstances. This reflected immensely on our survival as species, since our invention of tools and devices shifted us from smack in the middle of the food chain to the very top (Harari). So, while most beings on this planet were prone to natural threats, humans developed and used extensions for their bodies that allowed them to overcome all threats and challenges, like predators or diseases. This is an important fact to remember because while other mammals took millions of years to reach their natural place on the food chain, humans made that leap quickly, which meant that our psychological maturity did not catch up with our cognitive abilities, and this is clear in our attachment

to our tools as our best means of survival (Harari). Understanding our history with making and technology is important in order to identify how it affects us as individuals and societies. **Makers weren't designated people who received official training, everyone was a maker, and everyone makes what they need.**

According to Martin Heidegger technology, or *techne*, is one of the oldest human means and activities that helped position the human race in a central role on this planet (Dreyfus). By using this definition for technology, the similarities with making become evident. **Like making, technology was envisioned to enhance people's lives and their chances for survival.** The reliance on technology to overcome challenges is based on a relationship that is tens of thousands of years old and with countless successes. However, in the 20th century, a "technoscientific" leap caused a shift in how we perceive our world. The "Sputnik" satellite was launched and was able to encompass the planet within a human-made artefact for the first time, and replaced Nature with Ecology (Jin). During this time, our relationship with technology got stronger, and our reliance on it to solve all our problems was peaking. **Industry and academia capitalized on technology and positioned themselves as the exclusive sources for technical proficiency.** However, our relationship with technology had several

FIGURE 9: Hominins-made stone tools in central Arabia, dating back 190,000 years ago

FIGURE 10: Sputnik Sattelite - Launched on October 4, 1957 at 7:28 pm local time

unplanned side-effects on our cultures, environments and our human psyche (Jin). Heidegger believed that the most crucial impact technology has on humanity is not the destruction of nature and culture, but rather its restriction of our way of thinking and perception (Lamarre). In other words, we became tied to a single way of thinking, a technological way to evaluate humans and things "in terms of how its usefulness might be technologically optimized" (Lamarre). Thus, this restriction to our way of thinking has pushed technology to become the dominant logic upon which we measure everything, similar to how language limits our expression of emotions and ideas (Jin). Studying this effect on our way of thinking, Heidegger defines this as "the condition of technology" rather than the issue of technology, and the reason he makes this distinction is because he is urging us to stay away from considering a technological solution to this challenge and rather compel us to recognize "our essential receptivity to technology" (Dreyfus).

While reliance on and advancements in technology grow, so does the distance between the maker and the user. We no longer see objects and devices that reflect and serve the makers and their communities. Instead, we have designated production powerhouses that focus on the financial goals of the manufacturers and measure their

success with profits and efficiency. **While historically, humans have always been active makers, today, most people rely on big manufacturers to design and produce their devices in far away labs and factories.** The result is a systemized process of production that utilizes science and design, delivered through our schools and universities, siloing knowledge, and protected by patents and copyrights. Manufacturers create products with short lifespans, for people they never met, to increase the profit margins for their shareholders. Technology is packaged and repackaged iteration after iteration changing our perception and receptivity to it every time. We've becomes entangled to a way of thinking that values attractive incremental advancements at the expense of knowledge and the planet. Because in this system, knowledge and valuable natural resources, are being actively taken away from the people and replaced with millions of disposable products that serve countless mediocre functions. To counter this tide, making "lies far beyond the thoughtless production and supporting the vision of those who manage" (Charny). Making opens the door to new ways of evaluation and to new solutions and directions. It can help reverse these effects, which would finally allow us to reap the human benefits of technological advancement (Charny). This means, people from anywhere in the world have the opportunity to identify what they need, learn how to make it, use it, and improve it. It also allows us to interact with the

FIGURE 11: Cover of Power of Making published in 2011

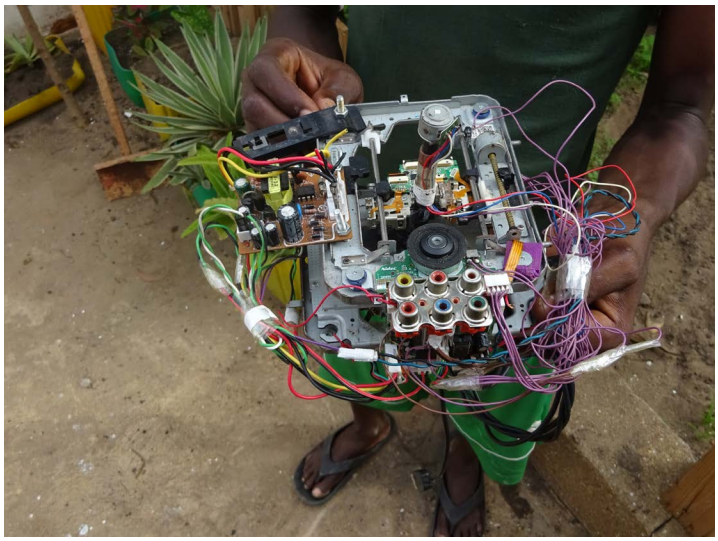


FIGURE 12: 3D printer made from electronic waste sent to West Africa

materials world and discover new possibilities and opportunities that serve communities of people rather than a board of directors. Africa provides ample evidence of makers turning debris into functioning technology.

My grandfather had a unique relationship with technology. While on one hand, he constantly expressed his appreciation to what the little colourful components can achieve when put together, on the other hand, he also experienced several wars with Israel that forced him to experience the deadly side of technology. As A result, he had tremendous respect and fear from what it could achieve. **Technology, when used mindfully, can allow people to survive deadly situations, like diseases or natural disasters.** However, technology also made an unprecedented exploitation of our planet and everything in it possible. It allows people to subjugate others, to manipulate ecosystems, to exploit natural resources at the expense of all other beings, and it creates a skewed moral ground that vindicates these actions. Incremental enhancements to technology are being commodified into hundreds of iterations sold as "the new" or "the most advanced", and have limited lifecycles, until the new iteration is rolled out, and the old one is discarded. Landfills all around the world stand as witnesses to this unbalanced cycle of resources and waste. We observed these landfills grow and become landmarks akin to

mountains and lakes. So, while our landfills grow bigger with more and more resources, the knowledge and skills needed to reappropriate and re-use these resources dwindle. The industry's shortsighted decisions combined with our technical ignorance created a situation where a tremendous amount of opportunities are literally wasted. Thus, the rise of electronic waste levels around the world is a symptom of knowledge deprivation, and that is the real issue. **There is a crucial need to address this problem, and reverse its outcomes.**

For me, understanding and appreciation of objects in general and electronic devices specifically, only comes with the knowledge of how they work and how they were built. However, more and more we are witnessing manufacturers who invest time and money into hiding their technology and keeping the "user" away from it. This is clear in newer devices which have less to no access to the inside and inner workings of the machine and instead get a highly refined polished look that seems like magic. **The goal of this is to monopolize the knowledge of how these devices work and as long as we do not know, they have full control of our relationship with it.** The result of this power play is a product that is made according to the visions of the manufacturers and to be used in a predefined way for a predefined time period; until the new model is released.

FIGURE 13: Four Hill Landfill, Nashua, NH, USA

FIGURE 14: Miyazaki's "Castle in the Sky"

Making has the potential to undo this entanglement. My grandfather saw this opportunity of making and pushed me to see it too. Making demands breaking those devices to know how they work and to know how to make your own. And by taking the maker's position, the user has full control of what they need, how to use it, how long to use it for, and the full capacity to decide what to do with it next. **Making makes us rightful owners of our devices.**

This study is not anti-technology and the ideas that result from this study are not intended to fight it. I value technology and appreciate the possibilities it creates. However, **my intentions are for the audience to recognize and reconcile with our current situation first, and then, to inspire the revival of our sense of making as a daily activity in our lives.** While it is not feasible to find a singular solution from these texts to save us from the condition of technology and its manufacturers, it is essential however, to acknowledge the outcomes of this relationship on humans and the planet. In "Castle in the Sky" Miyazaki resolves this condition not by developing human mechanisms to help guide and lead technology, but rather by the characters' realization of how technology affects the "non-technological world" (Lamarre). In Dreyfus' words, "the danger, when grasped as the danger, becomes that which saves us" (Dreyfus).

Manufacturers take control

Technology is used as **a tool to empower people against all sorts of challenges on one side, and on the other side, a tool in the hands of the manufacturers to maintain a structure where people become mere end-users of received technology.** By stripping us from our ancient right and ability to participate in making or enhancing technological devices, manufacturers capitalize on a system that prolongs and deepens our dissociation from the things we use everyday. In this system, manufacturers are driven by financial goals that require an absolute dominance over the industry, and invest money and time to maintain that dominance. Mercenary engineers, designers, developers, and much more, have all been recruited to serve the manufacturers' profit margins by creating devices and solutions that exploit our relationship with technology. These products tend to mislead people into believing in their empowering features, yet exist to profit their manufacturers' shareholders. That occurs by locking-in customers for a time period before their planned obsolescence comes into effect. At which point, the products no longer serve to profit the manufacturers, who absolve themselves from this outcome. Planned obsolescence is a well-known strategy that manufacturers use and which designs products

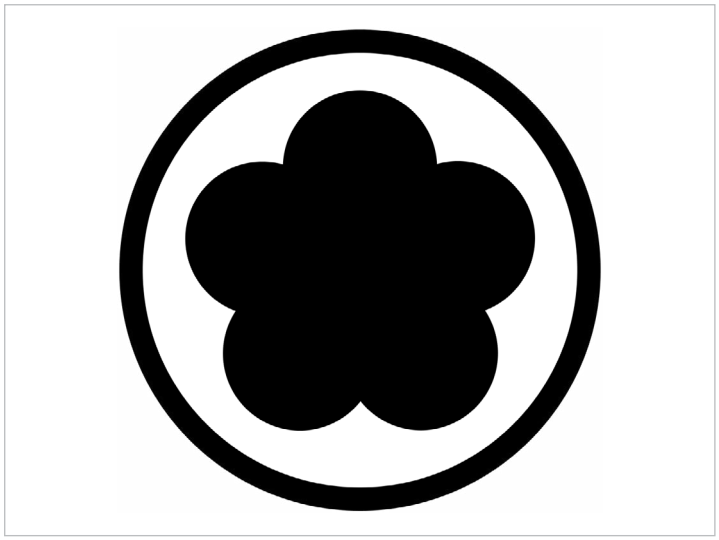


FIGURE 15: Pentalobe screw head

FIGURE 16: Electronic waste, soon to be shipped to recycling facilities

to become obsolete after a certain time period, usually followed by the introduction of the newer version. Planned obsolescence ensures the continuity of the manufacturers, not by designing and producing durable and sustainable products, but by creating disposable solutions that are cruel to the environment. It is a conspiracy that serves to maximize profits by abusing technology and exploiting people and the planet. Myriad devices and objects, made of plastics and materials that take up to thousands of years to decompose, become obsolete in about eighteen months. **We, the people, are bombarded by these devices everyday, offered at cheaper and cheaper prices, with no sign of slowing down.** Fact is, 25 to 50 billion devices will come online by 2020 (Joseph and Pennington).

With enhancements and developments in the industry, manufacturers maintain a solid advantage, mainly due to global trade policies that ensure cheap production and wide delivery. In this scenario, manufacturers resort to complex solutions like lock-ins, patents and copyrights to protect and hide their technologies and with that monopolize the knowledge. Apple's "Pentalobe" screw demonstrates the extreme measures manufacturers would resort to, to hide their technology. **It is designed to give Apple the exclusive right to open, learn, repair and**

teach the inner-workings of their devices (Weins). However, it also demonstrates the real distance between the user and their device, and it defines ownership of that device. According to the "iFixit Movement", who successfully created toolkits that provide makers around the world with the tools and knowledge to access locked devices, "If you can't fix it, you don't own it"(iFixit). This reveals an important phenomenon in which purchasing a device no longer entails ownership by the customer, instead, manufacturers own and lease temporary and limited use of their devices to "users", who are pushed to upgrade their devices to continue accessing that technology. We no longer know or own the devices we use, and it is no surprise we don't know how to deal with them once they don't work. An ironic cycle of production, ownership and abandonment with the manufacturer as its strategist and beneficiary, while the user is seen as a resource exploited for money. These strategies are to ensure the manufacturers' position as the exclusive source for technology and the proficiency behind it. It is imposed by a technological order to exert dominance over people and all living things. A hierarchy of power, that positions the elite above others and driven by money. It is a pedagogical system that presumes the ignorance of the people in order to disregard their individual opinion and impose on them a blanket solution

FIGURE 17: iFixit Manifesto, www.ifixit.com

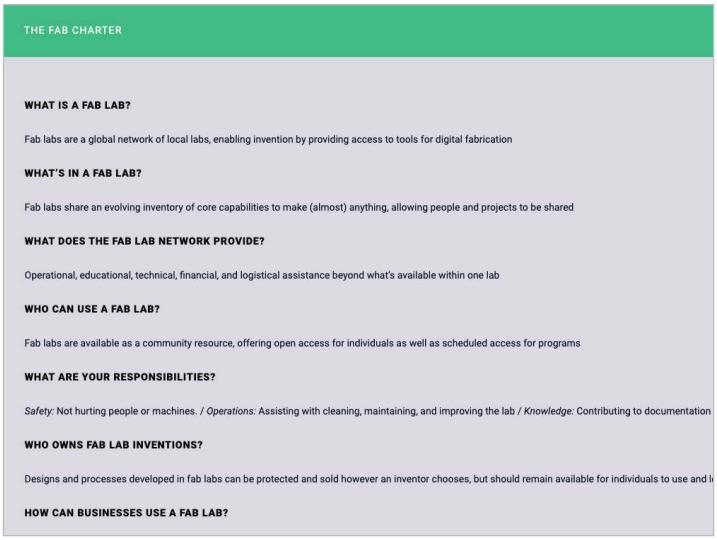


FIGURE 18: Screenshot of the The Fab Lab Charter

(Freire). Classifying people as mere users who cannot identify their needs and expectations and instead rely on big manufacturers to set those criteria for them. This confinement of people as users clears the manufacturers' burden from meeting the needs and expectations of their customers and instead defines those needs and expectations. It allows the manufacturers to steer the direction of technological growth and impose on people what they deem necessary and useful. The outcome: while manufacturers continuously develop and advertise newer iterations of gadgets and devices with shorter and shorter life-cycles, the world is struck with a tsunami of end-of-life electronic products that were deemed useless by their makers and left as burden on people and governments tricked into purchasing them and with no knowledge of how to find use in them or even access them. **These products live and interact with us daily**. We "give them permissions" to listen to our conversations, record our moments, and read our biometric data, yet we don't own them or know much about them outside their marketing campaigns.

Academia and the manufacturing industry have had a complementary relationship that ensured the continuity of both. While manufacturers enjoy an unchallenged position in the production industry,

academia provides legitimacy and the workforce. Academic institutions develop and deliver education that strengthens the chokehold manufacturers have over this industry and alienates individual makers like me, or my grandfather. Making is reduced and seen as an illegitimate source of knowledge that does not qualify to be shared in institutions of education. Instead, we are taught recognized and certified schools of thought that serve to strengthen the status quo and the current order of power. This imbalance was extensively discussed by several makers like Garnet Hertz and Matt Ratto, who coined the term *Critical Making*. In "DIY Citizenship", Ratto and Hoekema express their frustration with the irrelevance of making inside academia and wonder if we need a "Copernican revolution in order to sweep away these wheels within wheels" (Ratto and Boler, p. 229). There are many success stories for acknowledging making as a legitimate source of knowledge, but we have yet to see a full across-the-board recognition of this way of life and the knowledge it creates. That said, many makers around the world, still protest and resist this delegitimization and isolation like the FabLab Foundation, which connects and assists around 1000 maker spaces around the world. According to their online page, the FabLab Foundation allows labs that share "same principles, tools, and philosophy around the future of technology and its role in society" to share ideas, collaborate and educate. It represents a powerful coming-together moment that empowers and acknowledges makers all around the world, regardless of their background, education or technical proficiency. This, and similar movements, can provide making with a strong grounding and merit in its fight for survival against industry manufacturers and their academic collaborators. Similarly, to Ratto, *Critical Making* offers the maker a point of social intervention in which, **"reclaiming technology from ownership and control by the technocapitalist class, the citizenry will, in dialectic fashion, become conscious of technology as both means of oppression and democratization"** (Ratto and Boler, p.56).

Maker Movement

Before moving to North America, I never heard of the *Maker Movement*. I have not attended any *Maker Faire* or bought any publication of *Make Magazine*. However, during the past two years, I read about and attended several maker events and workshops around the city, and I began to notice stark differences between my idea of a maker and what is popularized to be "making". While makers in North America are mostly perceived to be small-scale manufacturers that aim to sell their products on the market. I know making as an ancient human practice that is meant to subjectively create things for continuity, enhancement, or enjoyment. That said, bringing independent makers together in order to "show and tell" other makers what they're working on is a useful way to open dialogue and share knowledge among the community (Dougherty). Investing and celebrating the knowledge sharing aspect of the *Maker Movement* highlights its benefits to the community, and its absence from my culture. While I conceptually agree with the benefits of a maker faire, I do however believe that the core values and ethos of independent makers ought to be reflected in those maker faires. This is not the case with Dougherty's approach, which "sanitized" and "depoliticized" the movement to be more "palatable to a commercial market" (Hertz). Makers are the product of the status-quo and a response to it, and thus cannot be depoliticized in order to maintain current power structures. **Declawing makers from their abilities to bring about change and awareness is damaging to the movement itself.** Through our creations, we, the makers, get to highlight and challenge issues present in our communities. We hack in order to show our communities what needs to be hacked and how. It is the freedom in making that makes it unique and effective, and we cannot remove that factor. By allowing corporate manufacturers or military organizations to fund or sponsor *Maker Faire*, Dougherty is putting the maker community at their disposal, utilized "as a source of talent and ideas" (Dougherty, p. 11).

This was a problematic precedent that promoted makers to become "producers" of products that are sold to users, products that turn to waste shortly after their production.

Noticing the untapped and unhinged creativity and proficiencies that independent makers were exhibiting in many cities around the world, several corporate manufacturers took notice and quickly rolled out new strategies to harness those skills and channel them to their advantage. After visiting one of the *Maker Faires*, Tim Bajarin, the president of Creative Strategies Inc., noted "This movement has caught the attention of many major players in the tech and corporate worlds. At the San Mateo *Maker Faire* were companies like Intel, Nvidia, AMD, AutoDesk, Oracle/Java, Ford, NASA, Atmel, Qualcomm, TI, 3D Robotics and many more that see this movement as important and want to support it" (Bajarin). **Positioning independent makers as producers that rely on sales for success tarnishes the fluidity and openness of making.** In 2016, *Maker Media*, the company that owns the *Make Magazine* and the *Maker Faire* brands, "was ceasing operations and that it had laid off 22 employees, citing financial difficulties with publishing a magazine and the lack of corporate sponsorship" (Liptak). Predating the failure of *Maker Media*, several corporate manufacturers have invested and hosted their own versions of maker

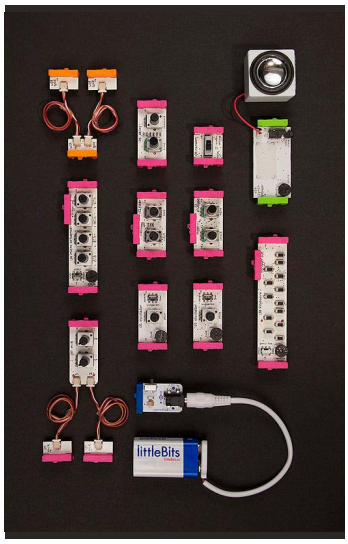


FIGURE 19: Synth Kit by LittleBits. founded by Ayah Bdeir

FIGURE 20: Cover of *Make: Magazine*, vol. 61

FIGURE 21: *Maker Faires* around the world in 2020

faires and hackathons (Singh). **It is no coincidence that corporate funding for *Maker Media* had diminished while investment in other maker faires has flourished.** It is a clear strategy by manufacturers to collect and silo knowledge and its bearers inside corporate structures, and utilize it for their profits. I believe our true power as makers is present in our independence from corporate systems and giving in to them means the erosion of our identity. To iterate the significance of makers in our world, during her TED talk, Ayah Bdeir, a Lebanese maker and engineer, told everyone, "I want to encourage a world of creators, of inventors, of contributors. Because this world that we live in, this interactive world, is ours" (Bdeir).

Following the *Maker Movement*, there has been a growing number of people that call for making to stop because our world does not need more stuff. Hillary Predko, a maker and a technologist from Toronto, expressed her personal disappointment towards the *Maker Movement*. Her experiences led her to perceive makers as waste producers who are thriving to sell their products to people as a sign of success in their field (Predko). Her independent research paper, Kipple Field Notes, illustrates a confliction with a desire to make on one hand, and an "ambivalence about making more products" on the other. Predko's perception of the *Maker Movement*

significantly changed, in her words: "As I began to interface with systems of production, even the small aspects that are available to independent designers, the naivety of the whole maker premise began to emerge in my mind" (Predko). Besides Predko, **there are red flags about maker communities promoting gender or racial bias are valid concerns, yet making is so much bigger and all-encompassing than one race or one gender, we are all makers and always have been.** Like language and trade, making is part of the human story and will continue to be, whether we approve of it or not. But making can be harnessed for its true value and positioned to serve communities, while in harmony with nature and the planet. A form of making that educate, include, and appreciate all people for what knowledge they can bring.

The act of protest

By definition, to protest is to express dissent against what cannot be currently stopped or prevented. From our recent and ancient history, we learn that humans have protested countless times as a response to systems of power. **Through *Liberated Debris* I aim to go on record in protest against the marginalization of independent makers and the complete domination of manufacturers over our everyday electronic devices.** There have been many before me who voiced their dissent against capitalistic drive behind technology and the way it impacts our societies and the planet. Liberated Debris is the vehicle for my contribution as a fellow maker and my way of joining my voice with the ones before me like Hillary Predko, Garnet Hertz, Matt Ratto, Marshall McLuhan, etc. We learn about protest from history is that there is not one method to do it. People from all over the world have utilized their own experiences, situations and aspirations to create their own forms of protest against their own suppressors and oppressors. One of the most important protest movements in recent history is the Jasmine Revolution that started in Tunisia in January of 2011. The revolution was caused by high unemployment, high corruption and food inflation, and it was eventually sparked by the self-immolation of Mohamed Bouazizi. It was the acts of a single individual that eventually activated change in people all over the country. After ousting the president, the Jasmine revolution demonstrated the power of maintaining a united and continuous protest against well-established systems of power and control. It shows that when one's expression of protest against systems of power is shared with the many, the outcome can be a substantially transformative movement at best, and an in-depth dialog fostering knowledge and understanding, at worst. The physical occupation that was demonstrated by the protestors during these revolutions reflect the deep urgency of their demands, which are hindering their everyday lives. It is also a reflection of the despair felt by the protestors towards their governments and their systems of power. The Jasmine Revolution grew to spark similar movements in several other countries like the Occupy Movement throughout many United States cities. However, not all protest movements have taken a physical occupation approach, some have chosen different routes to express dissent against oppression.

Other protest movements have taken a different approach with a different point of intervention. John Oswald, a musician from Toronto, was able to spark a musical movement in the 1980s to protest the music industry's highly restrictive copyrights laws, he called it "Plunder phonics". Musicians create plunder phonics by sampling, manipulating and overlaying pop music, in an expression of ownership over that music. In an essay submitted to the Wired Society Electro-Acoustic Conference in Toronto in 1985, Oswald criticized the Canadian Copyright Act, arguing that music that is constantly bombarding us, creating memories for us, actually to certain extent, belongs to us (Oswald). He believes that these popular tracks, played over and over again in public spaces, become like landmarks that we take and keep snapshots of (Oswald). By creating plunder phonics, musicians were exercising their ownership

over these popular tracks and protesting the copyright laws that aim to restrict that ownership. Similarly, *Liberated Debris*, in some ways, are an example of a protest against restrictive laws that limit our ownership of our devices.

Bill 72

On February 21, 2019, Mr. M. Coteau from the Legislative Assembly in Ontario, proposed Bill 72: "An Act to Amend Consumer Protection Act, 2002 respecting the repair of electronic devices." According to the proposal, the bill requires a company to give a consumer and repair shop what they need to repair the electronic products themselves. However, on May 2, 2019, after the bill's second reading, the bill was rejected citing concerns of "compromising US companies' intellectual property rights to the point that they would not sell their products in Ontario" (Pearson). Similar "Right to Repair" bills were introduced in 20 US states, which means **more people are standing firm and behind their rights to rightfully own their devices and repair them as they please.** While none of the bills were approved by any legislative body, it has widened the dialog among people and eventually forced some companies to revise their strategies bearing in mind repairability and continuity of their devices. For instance, Apple "announced a new program in August that will, for the first time, allow independent repair shops to get access to Apple parts and repair tools" (Proctor).

While I firmly stand behind the "Right to Repair" bill, I argue that it is not enough. Even if the bills pass, without the majority's willingness to take on repair and repurpose projects, we will not be able to fully reap the benefits of such bills. The change must be initiated from both directions, forcing manufactures to share the knowledge and the tools with their clients, but also create that opportunity for the clients to employ the knowledge and the tools trying to extend their lives of their devices and avoid their unfair disposal due to economic gains. This bill is an important message to the manufacturers, because it lets them know that the people see the strategies imposed, understand their implications, and demand something better, something healthier.

Tactic: Activation by demonstration

Growing up, my grandfather successfully activated several members of his family to become active makers. He did that by exhibiting, countless times, an unexpected assembly of components with new purpose in life. Observing objects that were taken from their previous purpose and assembled in ways unplanned by their manufacturers revealed my grandfather's power as a maker. His approach was to demonstrate the empowerment of the maker by letting his objects tell their stories. I was drawn to grow my grandfather's approach to a tactic that harnesses our relationship with our devices and reverses the manufacturers' strategies. **Tactics are tools of the "non-powerful" to respond to the strategies set up by the "powerful"** (De Certeau). Strategies assume the powerful's control and predict the results, tactics are agile adaptations to the real-life observations of the situation at hand. In other words, while manufacturers assume their control and hegemony over the making and developing of electronic devices and their impacts, we, as makers, have the power to observe the real-life implications of these strategies, and develop tactics that can respond to them. Reclaiming our position, as makers, as pursuers of knowledge-sharing and gathering, and as enhancers of technology, is an agile tactic that can adapt to the changing world and address the strategies set by the powerful parties. It is both our burden and opportunity to be part of this struggle and its solutions.

For me, liberation from the suppression of manufacturers is built on our revival of making as one of our most human and oldest traits. Liberation not only for us, humans, but also for the objects and devices made and confined to an unfair cycle that is centered around the profit margins of the manufacturers. Thus, the process of

liberating ourselves from the chokehold of technology today, will bring the liberation of the objects made from this tactic. Therefore, exposing the systems of power and their collaborators starts with the redemption of the technical proficiency that is seized by technology manufacturers and their institutions. We can achieve that by hacking, tinkering, making, exposing and sharing devices and knowledge that will empower all of us around the world. And with redemption comes salvation. To contribute to this objective, I conducted a series of experiments inspired by my grandfather's teachings, and that aim to tell a story and shift the audience's perspective on used devices, activating an urge for making. **By making, and only by making, I believe people can activate and experience *techne*, the "craft of technology"** (Jin). My grandfather, perhaps unintentionally, enabled me to experience it by empowering me to try to make and fix things without the fear of failure. With every success and failure, my knowledge and understanding grow, and with it my *techne*.

Through *Liberated Debris,* I want to replicate my activation and transfer it to my audience. **I want to expose our power as independent makers and demonstrate our ability to rise up and obstruct systems that damage our communities and environment.** *Liberated Debris* is a set of musical instruments meant to protest the

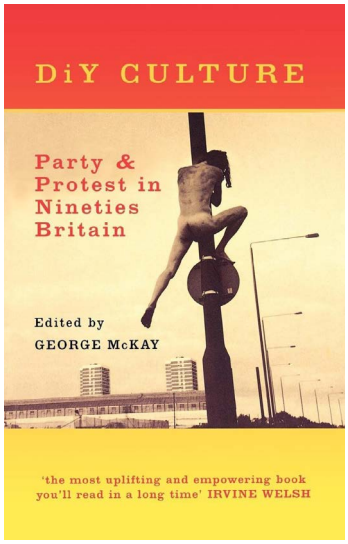


FIGURE 22: Cover of DIY Culture: Party & Protest in Nineties Britain

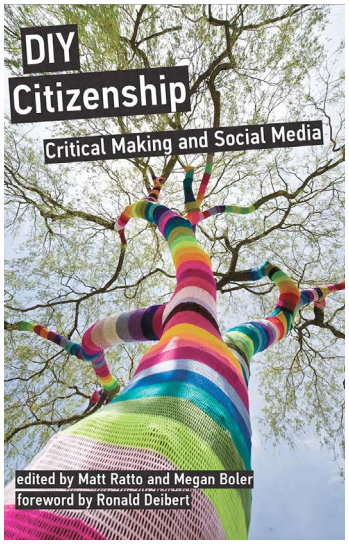
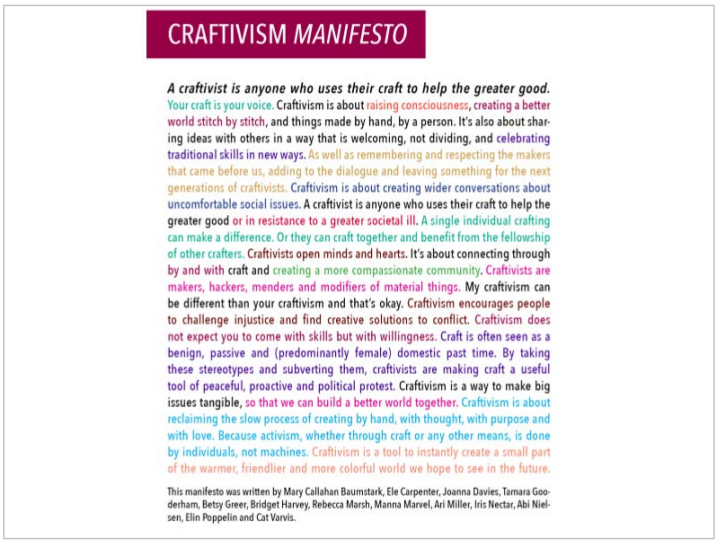


FIGURE 23: Cover of DIY Citizenship


CRAFTIVISM *MANIFESTO*

A craftivist is anyone who uses their craft to help the greater good. Your craft is your voice. Craftivism is about raising consciousness, creating a better world stitch by stitch, and things made by hand, by a person. It's also about sharing ideas with others in a way that is welcoming, not dividing, and celebrating traditional skills in new ways. As well as remembering and respecting the makers that came before us, adding to the dialogue and leaving something for the next generations of craftivists. Craftivism is about creating wider conversations about uncomfortable social issues. A craftivist is anyone who uses their craft to help the greater good or in resistance to a greater societal ill. A single individual crafting can make a difference. Or they can craft together and benefit from the fellowship of other crafters. Craftivists open minds and hearts. It's about connecting through by and with craft and creating a more compassionate community. Craftivists are makers, hackers, menders and modifiers of material things. My craftivism can be different than your craftivism and that's okay. Craftivism encourages people to challenge injustice and find creative solutions to conflict. Craftivism does not expect you to come with skills but with willingness. Craft is often seen as a benign, passive and (predominantly female) domestic past time. By taking these stereotypes and subverting them, craftivists are making craft a useful tool of peaceful, proactive and political protest. Craftivism is a way to make big issues tangible, so that we can build a better world together. Craftivism is about reclaiming the slow process of creating by hand, with thought, with purpose and with love. Because activism, whether through craft or any other means, is done by individuals, not machines. Craftivism is a tool to instantly create a small part of the warmer, friendlier and more colorful world we hope to see in the future.

This manifesto was written by Mary Callahan Baumstark, Ele Carpenter, Joanna Davies, Tamara Gooderham, Betsy Greer, Bridget Harvey, Rebecca Marsh, Manna Marvel, Ari Miller, Iris Nectar, Abi Nielsen, Elin Poppelin and Cat Varvis.

FIGURE 24: Craftivism Manifesto, craftvisim.com

manufacturers' dominance over the production industry and reveal to the audience a new truth about what is deemed waste or resource. Devices, parts, components and material all came together from different sources, each with a unique meaning and purpose, and assembled together to make music that reveals their past, present and future. My experiments, planned or not, do not exhibit new capabilities or functionalities, they do however, embody my view of what a maker is, and they sing a song of protest. Through the series of musical instruments, I protest the manufacturers' classification of people as mere users, which led to the consolidation and siloing of knowledge inside that industry.

Liberated Debris is a cultural protest responding to a cultural dilemma. As Christopher Manes, American Earth First activist and filmmaker, believes "the biological meltdown is most directly the result of values fundamental to what we have come to recognize as culture under the regime of technological society: economic growth, 'progress', property rights, consumerism, religious doctrines about humanity's dominion over nature, technocratic notions about achieving an optimum human existence at the expense of all other life-forms" (McKay). Therefore, the struggle is not simply to find new scientific solutions, but rather a cultural shift in how

we perceive value and aesthetics (McKay). And this is precisely why I decided to deliver this message through a personal and non-certified theoretical framework that takes advantage of the individual's experience and projects it as an alternative way of being. Mashing activism and making is not a new concept, craftivism, a movement similar to the *Maker Movement*, is fighting to reclaim proficiency and resist mass consumption and capitalist production (Ratto and Boler). However, this approach expresses my experience as a maker with my grandfather, and gives tribute to his teachings and influence. ***Liberated Debris* strives for an open world, driven by equality between all people, as makers, and free of the domination of manufacturers and their collaborators, all for one and one for all.** Since makers are driven by different priorities than manufacturers, we do not patent or copyright, we share knowledge for its own sake. This is the cornerstone of the process that distinguishes us and gives us our identity and meaning. Therefore, along with the repurposed instruments, I created an online tool, where makers can learn, share and continue the protest. The audience can link to that tool via a QR code embedded in each of the *Liberated Debris* instruments. It will compile projects, submitted by makers, and sourced from reused materials. The goal is to pass on to people what my grandfather passed to me, activation by acknowledgement and empowerment. Acknowledging that we are all makers and that making is a spring of knowledge that does not recede or end. With this acknowledgement comes empowerment of the individual. The tool, starting with me, will include a guidebook for each object, explaining the components, how to source them, test them, and a step-by-step instructions of how they're assembled. The goal of this tool is to create a presence for this movement and create a network of makers within it.

Making positions the maker in the centre of the process and allows them to reflect on how the components of the objects are sourced, their opportunities and implications, and how they work and fit together. The knowledge that is generated from this process does not only provide the maker with the experience for replication, but as any maker knows, it also grows the technical skills needed to personalize and improve the design and the functionality of the device. This shift from being mere users to makers as well as users amounts to a form of self-creation that progresses through making, and can be seen as a **"reaction against the regulation of identity that can constitute the lived experience of a totalitarian government"** (Ratto and Boler). Unlike manufacturers, who impose functions on users, making allows us to acknowledge that people use their devices differently based on their needs and experiences. It allows us to appreciate the diversity in people and materials, and take advantage of that diversity. Through making we can open technical proficiency to the world and with it, "intervene substantively in systems of authority and power and that offers an important site for reflecting on how such power is constituted by infrastructures, institutions, communities, and practices" (Ratto and Boler).

Why music?

Music has always been part of the human story and will continue to be a free form of expression unbound to schools and industry. Music, like objects, also accompany us throughout our lives and witness our most intimate moments and wildest parties. Songs and tracks that speak to us personally, yet composed and shared by people from around the world. Music triggers a sense of belonging, as in "my song" or "my jam", and it is a powerful sense of acknowledgement of the intimacy we develop with it. Yet, ownership and copyrights are strong reminders that these songs, although they belong to us in some way, are protected and restricted by corporate label companies. To pay for a track is to buy rights to listen to it, not to own it and use it freely. In other words, when we pay for a song or a track, we cannot open it and change it, we are restricted to a specified usage. This is a stark similarity with our ownership of devices where similar restrictions apply, and which urges us

to reconsider our understanding of ownership and society. Unlike most other objects, we develop intimate and long relationships with our musical instruments. While playing, the musician and their instrument can become one, expressing each other's emotions and creating a rich experience for both the audience and the musician. We also tend not to discard our musical instruments, even when they get old or malfunction. **The instruments become true extensions of ourselves and we cannot fathom discarding them to waste.** They are passed on from generation to the next while value and aesthetics are added with every move. *Liberated Debris* plays on that string of emotional attachment we develop with our musical instruments and relies on this relationship to extend the life and reach of the debris created through this project.

In Lebanon, music always provided a channel for expression and solidarity during difficult times of occupation and suppression. Lebanese musicians like Marcel Khalifé, Julia Boutros and Majida El Roumi were able to communicate emotions and views that others could not. **Music united us and brought us together.** People from all over the country would come and sing together songs of protest in support of the oppressed at home and everywhere in the world. This was the first time I witnessed the ability of music to trespass borders, language, copyright and subjugation.

FIGURE 25: First iteration of LD1100 - *Roots*

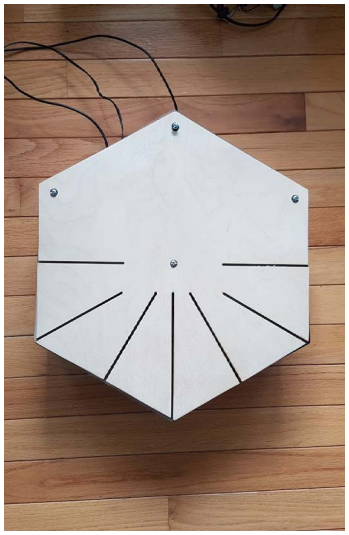


FIGURE 26: First iteration of LD1200 - *Hex*

FIGURE 27: Proof of concept test for LD1300 - *Loop*

FIGURE 28: Mock up prototype of LD1400 - *Strings*

Liberated Debris

The design goal of this study is to create objects that inspire and activate other makers. Making's potential as a form of protest, can be fully utilized to identify, demonstrate, and change the current technological order. It offers the maker a unique point of intervention in a system that abuses and neglects natural resources and people. ***Liberated Debris* is a series of musical instruments that exposes a dysfunctional system of production and design, and our tethered relationship with our things**. It's a physical collage of components, materials and parts, put together to reveal new meanings. In many ways, this series is an example of found poetry, deconstructed with a constructivist approach, broken in order to learn how to build. Bern Porter, a physicist involved in the Manhattan Project, dedicated the rest of his life after the project to finding poetry in unexpected places, like advertising and packaging. After his work was used to create the atomic bomb, Bern decided to shift his making practice to a process of finding purpose and use in found objects and artifacts. He attempted to find new meaning, beauty and value in things that were discarded and neglected, a task I also undertook while developing *Liberated Debris*. According to Joel Lipman, "The metaphysics of Bern Porter's found

art recognized that everything retains a shard of meaning, even the rudely discarded or woefully obsolete" (Porter et al, p. xvii). **As a whole, *Liberated Debris* represents wasted resources and abducted knowledge, but individually, each instrument, with its parts, tells its own story and defines its own meaning.**

Knowledge creation and sharing are key values that making brings. So, each of the *Liberated Debris* instruments will embed a QR code that links the audience to the instructions manual (see Appendix E) that will guide them through the process of making each instrument. As this is the first time for me to attempt to build any musical instrument, I had no previous knowledge or proficiency to turn to. Instead, I employed my grandfather's teachings and reminded myself that with making comes knowledge. *Liberated Debris* exhibits this potential for making simply by existing.

LD1100 - *Roots* (See to Appendix A)
LD1100 is an electroacoustic percussion instrument that stands present with its new purpose for music and change. Made as a piece of furniture, from adjusted and reassembled materials, this instrument resembles a traditional Middle Eastern coffee table that is recognizable in every home. The traditional table is passed on from generation to another, appreciated for its craftsmanship and presence. Likewise, **LD1100 too is designed as furniture, for a long relationship with its owner and open for modification and change.** In this piece of furniture, I repurposed speakers, a power supply, amplifiers, wood and materials from donated or collected objects that were otherwise deemed waste. It's parts have come from an old car, a personal computer, a stereo, home furniture and a bass guitar. The experiences that these objects and parts have gone through are retained and celebrated within this object. As a *Liberated Debris* instrument, LD1100 challenges its parts' obsolescence by demonstrating their ongoing functions and resists abandonment by having a traditional, durable and modular design.

LD1200 - *Hex* (See to Appendix B)
LD1200 is another percussion instrument that demonstrates transformation and exploitation. While visiting multiple electronic waste recycling facilities, I noticed that portable wireless speakers represent a large portion of discarded electronic devices. While these devices have not improved significantly in the last few years, manufacturers continue to capitalize on the existing technology by repackaging it over and over again. With its parts mostly collected from cheap wireless speakers, LD1200 testifies against an industry that exploits low-cost production and materials to maximize profits. By collecting and repurposing those speakers, I have liberated these parts from their doom, gave them new purpose, and told their story. **As a *Liberated Debris* instrument, LD1200 attempts to demonstrate the maker's ability to transform objects to fit their needs or interests. It allows the audience to witness what a maker can create from resources that were considered to be waste.**

LD1300 - *Loop* (Refer to Appendix C)
Unplanned and unexpected, LD1300 is a result of pure experimentation that leads to knowledge. While working with piezo and speakers, I discovered an interesting interaction between them when they come close to each other. That interaction, I later found out, is called a feedback loop. It is similar to the one experienced when a microphone comes close to a speaker. LD1300 demonstrates how knowledge can be produced and applied from making and experimenting, and creates both material and theoretical proficiencies for the maker. This instrument is made from repurposed materials and parts that came from an old home theatre system that was discarded by its original owners. Designed and built for an immersive interaction with the users, LD1300's unique layout and repurposed materials that challenges our idea of musical instruments. **As a *Liberated Debris***

instrument, the LD1300 resists our misguided disposal of our devices and our understanding of music and musical instruments.

LD1400 - *Strings* (Refer to Appendix D)

Inspired by Maurice Martenot's 'Ondes Martenot' musical instrument invented in 1928. Martenot, a French radio operator during World War I, got inspired by military radio oscillators during the war and decided to create a musical instrument based on those sounds. The 'Ondes Martenot' is a transformation of military machine sounds to an instrument of warm and harmonic sounds. While LD1400 is not a replica of the 'Ondes Martenot', it does, however, use one part of it as an inspiration. LD1400 is made from repurposed wood, a discarded bass amplifier, and used guitar strings. Through an interaction with the audience, the instrument creates warm and harmonic sounds that resemble parts of the 'Ondes Martenot'. **As a *Liberated Debris* instrument, the LD1400 demonstrates its maker's identity and material transformation.**

Conclusion

As we venture deeper into a world of technology and embed it in our everyday lives, the question of our relationship and ownership of the devices that deliver it emerges. If manufacturers continue to design and produce our devices with obsolescence dates and patented software and hardware, and we continue to take the role of the obedient user, **then we are destined for a world void of all natural resources and full of polluted landfills.** Motivated by this dystopian future, I ventured into this study attempting to reposition making as a form of protest against it. Activated and mentored as a maker by my grandfather and trained as a designer, I set out to expose our reliance on manufacturers on one hand, and to engage and inspire makers to become active members of our society on the other. To achieve this, I was guided by a question of how I can readdress making to inspire and motivate others to become makers that reuse their existing resources and with that produce less waste. This is the making I know, the maker I was raised to be.

I want to bring making into our everyday lives and through it I want reduce the waste produced by the manufacturing and commercial processes of production. I want to activate makers and boost them with a sense of *techne*, a "sensible, disposable and unsayable" way of making that you **"get it in your hand and feel it in your heart"** (Jin). Words, alone, are insufficient to communicate this knowledge since words, as we've witness, change meanings through time and reflect only the context of the time they're written in. Therefore, the knowledge of *techne* can only be achieved through the practice of making. Therefore, I created *Liberated Debris* as a series of musical instruments that urge other makers to reuse and repurpose resources and materials deemed waste. Through this project, I demonstrate the feasibility, resourcefulness and reusability of common electronic waste, and our ability as individual makers to benefit from that. ***Liberated Debris* recognizes making as a legitimate response to the siloing of knowledge and forceful subjugation.**

Liberated Debris empowers the independent makers by acknowledging them and by repositioning them to be crucial members of society moving forward. **As a series, they challenge our perception of waste, from unwanted and unloved, to an intimate proud relationship, unhindered by technology and time.** As individual instruments, each addresses a small yet important element of our relationship with our objects and our understanding of ownership of those objects. Besides the individual message and purpose behind each instrument, Liberated Debris, as a whole, represents a vehicle of protest for the repurposed parts.

Liberation in this context, does not only refer to our liberation from the domination of manufacturers over our everyday lives, but also the liberation of every repurposed part. These little parts and components that together build the most complex electronic systems, yet are quickly deemed obsolete shortly after production. T**hose parts are victims of an unjust process of production, consumption and disposal, which leaves them in tons all around the world.** Liberated Debris is a platform of protest for victims of the capitalist manufacturing process, both makers and the repurposed parts. And through Liberated Debris, we can continue to give those parts the ability to sing their stories, continue to accompany us, and to resist their early abandonment as trash.

Individually, Liberated Debris also tells the story of each instrument and its building parts: LD1100 protests planned obsolescence and our imposed short relationships with our devices. It challenges the idea that objects should be regularly upgraded to better models while we maintain a shallow, yet vulnerable relationship with them. LD1200 protests a system of production that produces a sea of waste, yet full of functional, usable resources. It challenges its parts' disposal by demonstrating their actual durability and adaptability. LD1300 protests the limitations that we project onto our devices and our abilities to repurpose it. It demonstrates that we are able to adapt objects and devices to our needs and goals. LD1400 protests the forced discontinuation of old devices and our insistence to measure things on scales of efficiency and optimization. It is a resurrection of an old and forgotten musical instrument that pioneered our way into electronic music. It acknowledges its heritage and pushes for a future that celebrates individuality and diversity.

Liberated Debris is a reflection of a personal and passionate experience I had growing up as a maker under my grandfather's mentorship. It allowed me to remember, reflect and re-explore my grandfather's teachings, and reevaluate them in my life in Toronto. Through this process, I had the chance to revisit those moments and situate them in an academic space. Then I had the chance to test them, practice them, and reconfirm my belief in making as a way forward in a world saturated with end-of-life products and ruthless manufacturing processes and strategies. A world where we are told and forced to accept presumptions of our needs and use of electronic devices, and our oblivion to the loss of knowledge and its implications. In this world, where individuality is no longer present in the use of our devices, and replaced by a replicated experience that demands conformity, making is the resistance. **Making is the ancient human activity that can position the human back into the centre of the process of production, consumption and disposition.**

A call to action

We can no longer afford to be complicit users, herded by manufacturers to want and pursue products that serve them. From this moment on, **we need to take control on our relationship with our devices and break the cycle** that keeps the systems of power in place and our resources in waste. It is time to **redefine words** that forge a construct where we are waste makers, mere users or technologically illiterate. Let us **liberated our objects** from this vicious cycle. We have to **stand as evidence** against these false realities. We are makers, from a responsibly sourced home-cooked meal, to the morally grounded open software, we are all makers and we are all in this together. We cannot continue to exploit natural resources, our making must be **committed, first and foremost, to the resources already at hand and devoted to serving our communities and our planet.** Our voices must come together for this tactic to propel us towards a better, more humane future. **It is time for the makers to stand.**

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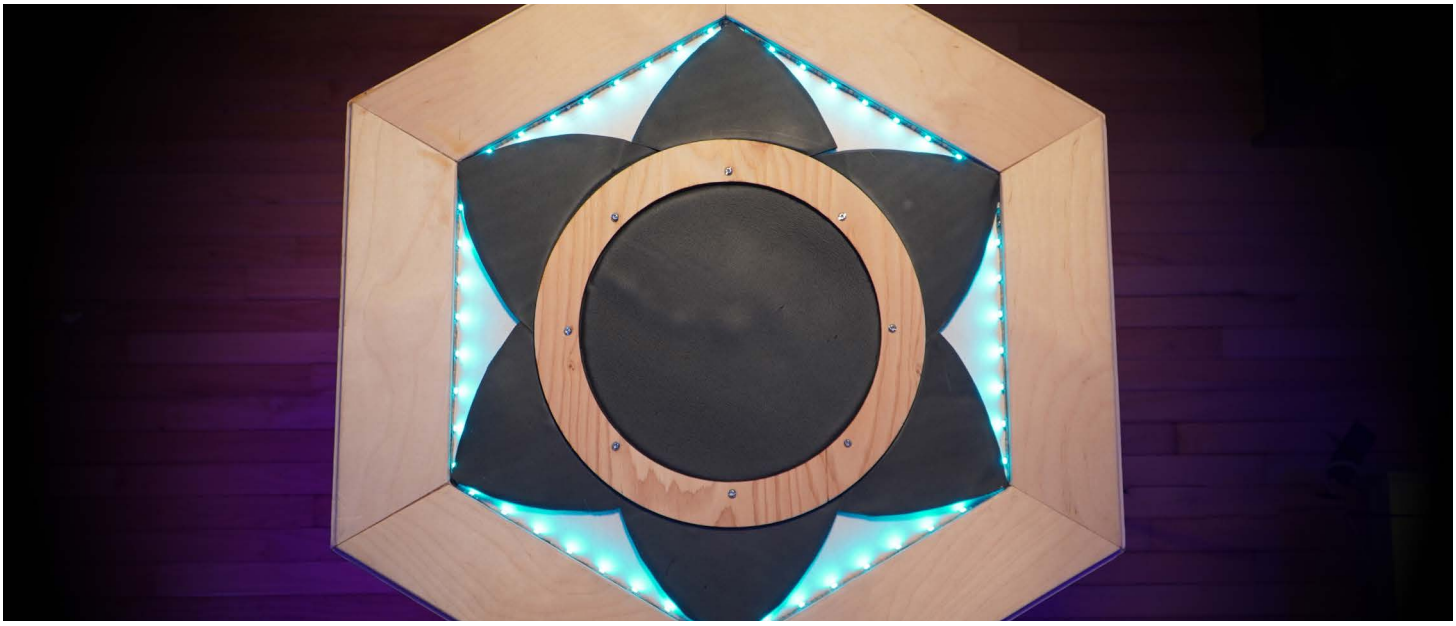
Appendix A - LD1100 - *Roots*

Concept **Link to video**

LD1100 is a percussion instrument made mostly from reused materials that are commonly discarded by people. It presents an alternative direction and a protest to the wasteful disposal of resources. It demonstrates the amount of resources wasted by people and symbolizes a rebirth for these components and parts that found new purpose and a new life. The concept was to bring a set of components together and assemble them in a way that opens and disseminates seized knowledge. It is designed to be customizable, held on to perpetually and passed on to others rather than to waste. Besides the revival and repurpose of the components that make it, LD1100 is also designed to inspire and activate other makers to make their own versions through the disbursement of an instructions manual that shows the entire process of selection and fabrication.



Motivation

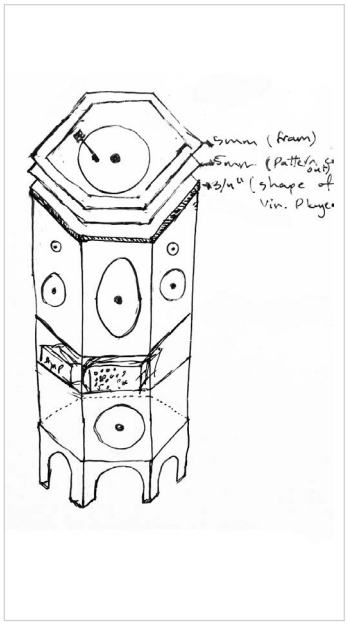
The motivation behind making LD1100 is observed through many aspects of making this device. First, I planned to create something that speaks to my background and culture in the Middle East visually and functionally. Second, I also aimed at creating an object that transcends commercial lifecycles and instead of depreciating in value and functions, it is preserved by the user and passed on with appreciation to its value.

Activation

The main goal of this thesis project is to achieve activation through demonstration, and by presenting this device and acknowledging its origins, I aim to activate and inspire the audience to adopt making as a way of life, and a tool against wasting resources. LD1100 achieves this by demonstrating a new purpose for its old components and a new acquired and shared knowledge by its maker.

Design

The design approach I used for this project is rapid prototyping. The process started with an inventory of available resources collected from donations, waste, and personal collection. After this step, prototypes were developed and tested for their functions and limitations. The process of prototyping fits perfectly with my background as maker and as a designer, since it brings both skills together in a productive way. For example, after developing a design brief and a list of materials and components available, I was then able to build prototypes that respond to these criteria and assess their success. Aesthetically, I was focused on creating a design that speaks to my culture and represents timelessness for the object. Essentially, I aimed for a design that does not lead the instrument to waste after a certain time period, but rather grows with the user and adapt to future functions the user might add. This is the reason I chose for this object to resemble traditional furniture common in a home in the Levant, the coffee table. This coffee table represents a different era in our culture and tends to be passed on from one generation to the next, gaining sentimental value and presence.



Repurposed materials

Since this experiment is based on objects received from donations or collected from trash, I was limited to the materials available to me. Also, since this object aims to respond to the rising e-waste levels among other things, the materials I choose to work with had to be considered from an environmental standpoint. So, after considering the materials available to me, I decided wood is safe and available in most homes. Also, wood is a highly reusable material that can be readapted for any new purposes fairly easily.

The wooden structure that holds the sculpture together is from a broken cabinet, cut and modified to fit this new purpose. While this might not be the easiest way to acquire and work with wood, it does however, reduce waste and activate reuse. In addition to the structure, the outer panels are wooden floorings that are also commonly available in homes and can be found and reused relatively easily.

Repurposed electronics

Speakers

In total, this project has eight speakers, all reused from old electronic devices. Each of the speakers was selected according to the function that was assigned to it at the beginning of this project. For example, for the low-frequency bass centre pad, I used two subwoofer speakers, one 12-inch speaker removed from an old bass guitar amplifier, which produces deep vibrations, and the other is a 6-inch speaker taken from a home theatre system, which produces a clear bass hit. In addition to the subwoofers, I used a pair of speakers with different characteristics for everyday drum pads, and the goal for this decision was to simulation different sounds for every pad.

Amplifiers

For the LD1100, I used one main amplifier and complemented with a series of smaller ones to ensure sounds quality and audibility. The main amplifier used was removed from a totalled car and was bound to go to waste. It is fully functional and still performs as designed.

Motors

The reason I decided to use CD motors for this sculpture is to visually represent an old, yet working, technology that would place the audience in the intended mindset. The CD, as a part from the past is no longer a common part of technology used today and thus bringing it back to life for the audience will help situate them within the context of this project.

Power Supply

At the heart of this sculpture is a PC power supply that powers all the functions of this device. The reason I decided to use a PC power supply is because of its wide availability in homes and the variety of voltages and amperages it provides. For example, a common PC power supply provides three main voltages: 12V, 5V, and 3V, at an amperage between 20 and 30 amps.

Circuit

When it comes to connecting speakers to an amplifier, there are two types of circuits that can be built depending on impedance and voltage of the amplifier and its channels, series or parallel. In series circuit, the speakers share the 8-ohm channel and the total resistance is additive. So, two 8-ohm speakers wired in series will have a 16-ohm shared resistance. In a parallel circuit, on the other hand, the speakers divide the resistance, which is calculated by multiplying the resistance of the speakers and then dividing it by the sum of the all the resistance. So, two 8-ohm speakers will produce a total of 4-ohm resistance.

For this structure, I decided to use a parallel circuit in order to put less pressure on the amplifier and produce a clean sound that the users can hear and interact with. Also, since I am using speakers with different resistances, this approach protects the amplifier.

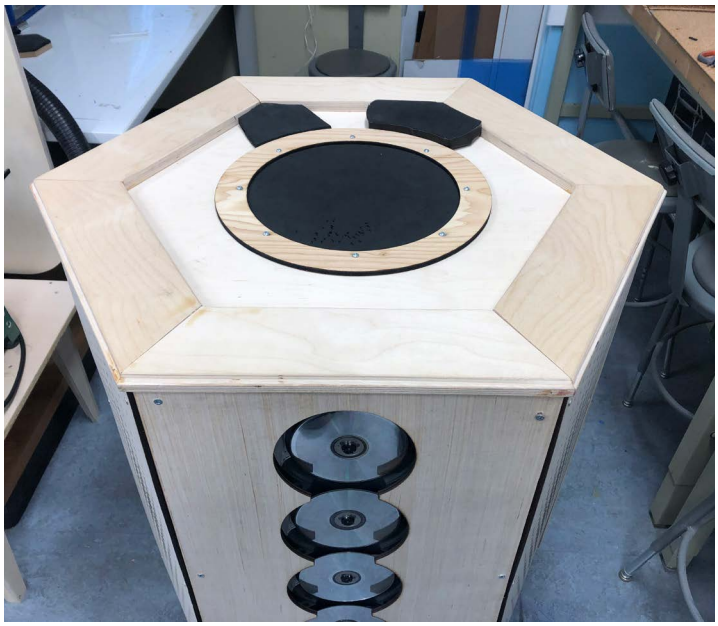
Instructions Manual

As stated in the introduction of this project, one of the main goals I set out for myself is to make this accessible by others. The way I want to achieve this is by limiting the parts to common parts that are safe and easy to use by people who are new to making. So, when creating the instruction manual, this approach was also considered as a guide throughout the process, and this is why the manual is highly visual, uses little technical terms and does not assume the readers to be highly skilled makers. When considering manuals for assembly or building, IKEA comes to mind as a successful example of accessible instructions manual that people with basic building skills can still understand and achieve a similar result as people with experience do. So, I decided to use the IKEA manual as an inspiration for creating the instructions manual for this project.

Results

First Iteration

Since this is an experimental design, the direction changed significantly after the first iteration was presented and the users' responses was observed. The first iteration of LD1100 was simply a 7-speaker stereo system made entirely from reused materials. The table top featured a discarded vinyl player that connects to a car amplifier then to the speakers. Although people appreciated the craftsmanship and concept of making something entirely from waste, I noticed that users did not interact with the object because the object offered no interaction, it simply played music. Without this interaction, the users, while they appreciate the object, did not reach the level of connection required for the activation to occur. I had to reconsider the interaction and consider new directions.



Second Iteration

After going back to the drawing board and restarting the ideation stage, I decided to transform the table from a stereo system to an electroacoustic percussion instrument that promotes interaction and play with the user. So, after removing the vinyl player from the table top, I created several drum pads that fit into the hexagonal shape. In addition to adding new drum pads, I also repurposed the CD motors from an old stereo system and placed them at the fron of the instrument in order to trigger the audience's memory about a technology that is obsolete. Adapting the

instrument to its new function was a relatively easy process because of the modularity and adaptability of the design. After completing the additional six drum pads, the second iteration of LD1100 will be complete.

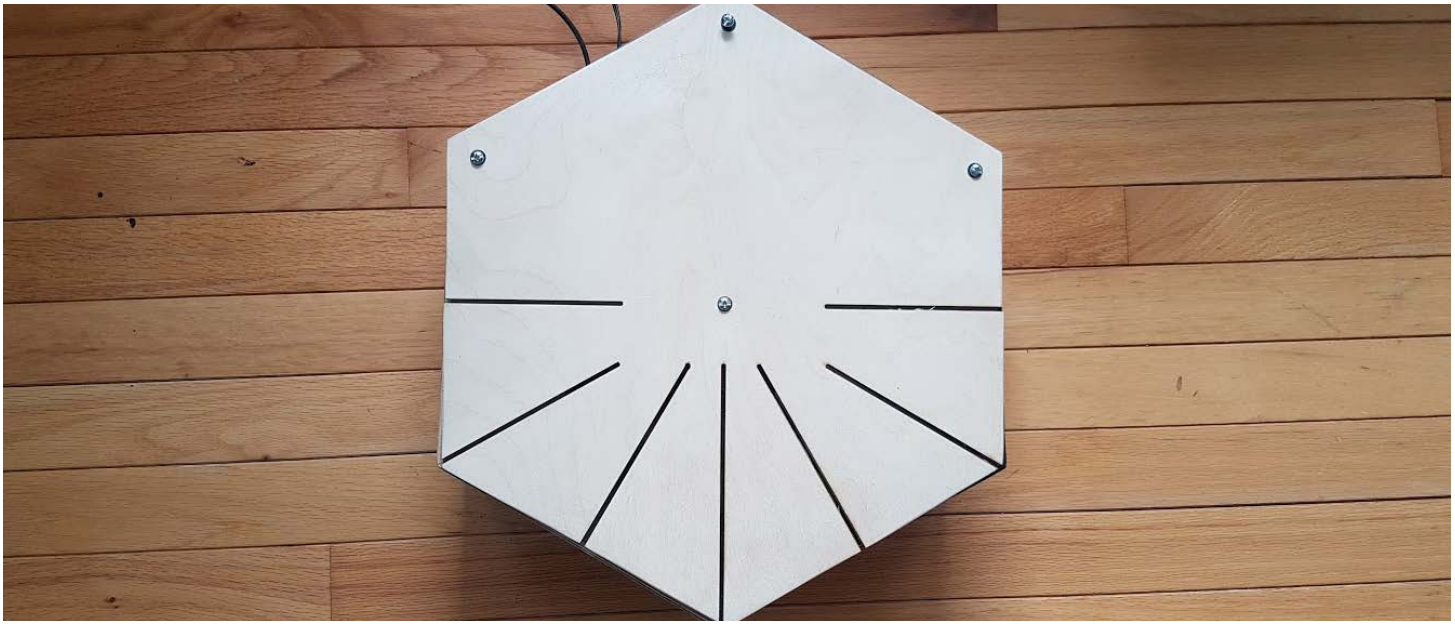
Going Forward

Roots was designed and built to be a permanent piece of furniture and constantly upgraded through the addition or replacement of its parts. So, depending on what I get to collect going forward I plan to find new functions and new effects to add to this instrument. For instance, I am planning to add the ability to play music while being able to play the drum along with the music. This interaction allows the user to have a rhythm to follow, which can be a fun interaction that is unusual for a drum.

Appendix B - LD1200 - *Hex*

Concept **Link to video**

LD1200 is an electronic percussion instrument that can be customized to the user's preference. The device is made from reused materials and parts like wood, speakers, and amplifier, in addition to a "Teensy" microcontroller. The result is a programmable electronic drum with a natural look and feel of an acoustic drum. The concept of this device was to create a musical instrument that utilizes a very common item found in electronic waste: portable speakers. In addition to that, LD1200 is designed to be a standalone electronic musical instrument that does not require external speakers or computers to operate. The goal of these objects is to inspire others and activate the maker in them. So, along with the device, an instructions manual will be shared in order to show people how this device was created, the parts needed and the knowledge behind making it.



Motivation

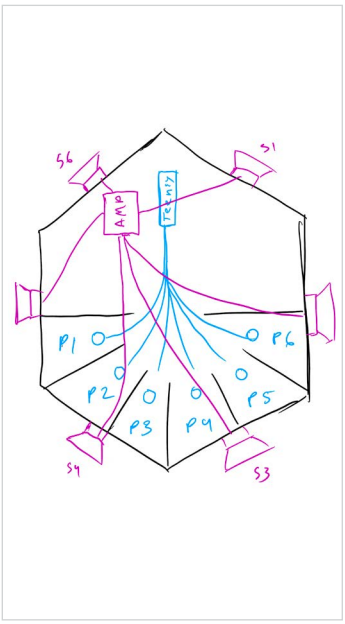
As an amateur percussion player, I developed an intimate relationship with this type of drums and wanted to make an instrument that speaks to that passion. In addition to that, with the advancement in musical instruments manufacturing, modern instruments tend to have a futuristic and complex interface that can be intimidating for beginners or new players. So, with that in mind, I wanted to create my version of what this kind of instrument can look and function from resources widely available for reuse.

Activation

Besides musical expression, LD1200 attempts to activate other makers by sharing its origin story with the audience. The parts that make LD1200 have been mostly sourced from low-cost bluetooth speakers that tend to have a short lifecycle. LD1200 provides these parts with a new purpose and a new function that surpasses its original ones. Also, by demonstrating how this device functions and how it is made, I will reveal the complexity that similar musical devices usually afford to the average person, who then becomes discouraged and intimated by its inaccessibility.

Design

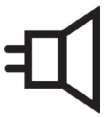
After analyzing the resources at hand, and identifying potential ideas, I used a rapid prototyping approach to build LD1200. One of the main goals of all *Liberated Debris* instruments is their open access design and build. Since most electronic devices available on the market are built to prevent users from accessing and tinkering with their components, LD1200 breaks that barrier and opens this technology to any one who is interested and willing to experiment and explore. The simplistic design of LD1200 allows easy access to the inside of the device, and open access to its programmed code. Although most drums are circular for acoustic purposes, LD1200 is electric, which allows me to explore other options. Since one of the main goals behind all the experiments on this thesis is to activate other makers and empower them to make things at home from resources easily found, I planned to make LD1200 easily recreated or reimagine at home. So, instead of a circular wooden structure that would require certain machines to create, I decided to use the hexagon as a suitable shape for the drum. Unlike circles, hexagonal shapes have straight lines and angles, which is easier to accomplish with found materials and minimal wood working skills. The wooden structure and its interface are consciously designed to have a simplistic and inviting interface.



Materials used

The materials used in the LD1200 are: wood, aluminum and neoprene foam. Wood is a great material to consider for its durability and reuse qualities, which is not the case with many other alternatives like plastic or metal, which require additional equipment and proficiency. Also, considering that wood is widely available for reuse and has acoustic qualities makes it a good candidate for material choice. In addition to that, wood also has aesthetic qualities that reconnects us with nature and the planet. Besides wood, aluminum and neoprene foam are used to create the drum pads that drive the interaction. The structure of LD1200 is created from reused wood from the Maker Lab at OCAD University. The interface of the device is laser cut and six panels are created within, each with a piezo device. To hold the structure together, the bottom part is glued and permanently attached, however, the upper part, the interface is installed using wooden sticks, and nut inserts. While neoprene provides a base for the piezo's, the aluminum focuses its pickup abilities.

Reused Electronics



All the speakers used to create LD1200 were extracted from low-cost portable bluetooth speakers, which were unwanted by their owners. After spending extensive time in waste recycling centres and donation centres, I noticed that these bluetooth speakers are extremely common unwanted devices. In total, LD1200 uses six speakers spread around each of the sides of the hexagon. This design ensured the acoustic capabilities of the instrument and dispersed the audio created equally around. The speakers are wired in parallel circuit in order to minimize the load on the amplifier.

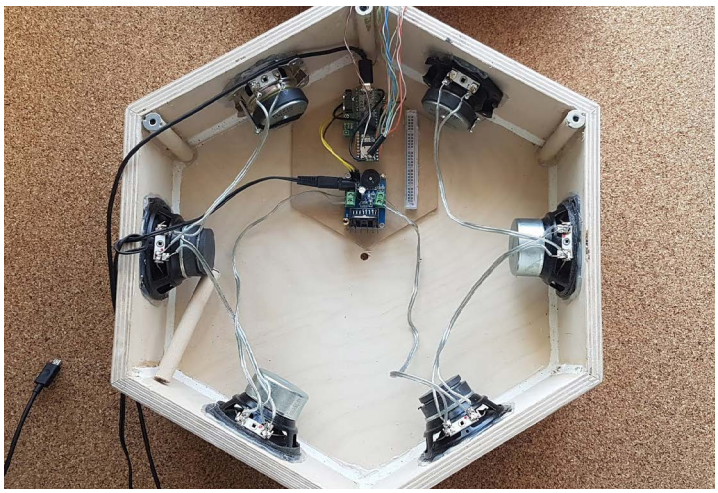
Code □ink to code

In order to read and process clean piezo signals I had to adjust the code to have a minimum threshold to trigger a hit. While this is not the most effective solution, it does however, provide a suitable solution that requires minimal parts and technical skills. Besides cleaning the signal, the code also assigns a selected sound output to each of the piezo triggers. This is achieved by converting a .wav sound file to a format that the Teensy can directly read and process, which results in a seamless interaction between hit and sound.

Results

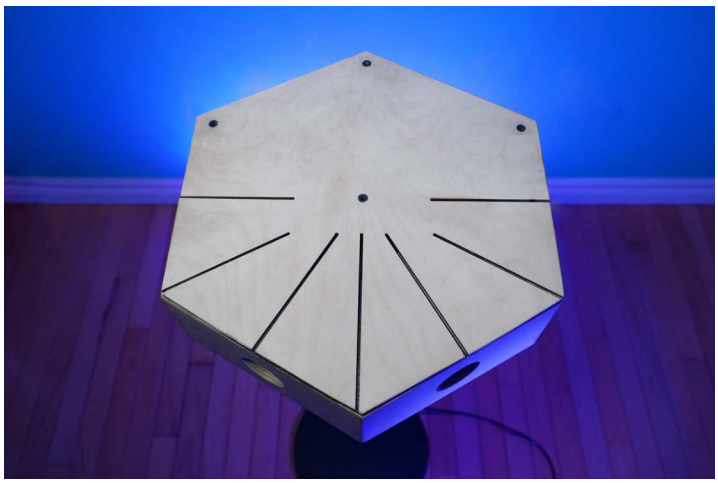
First Iteration

The first iteration of this device featured a simple interaction that only allows for a digital read of the signal. This means that the user can only register a signal as ON or OFF, without the ability to distinguish between a soft and a hard hit. In addition to that, after developing the first iteration of this instrument I realized that an additional layer is required below the neoprene in order to provide enough stability to properly read the hits.



Second Iteration

The second iteration included the switch to analog sensor from the piezos, which provided a much more accurate trigger following a hit. This allows the user to perform multiple hits at multiple sensors, and produce quick and natural sounds. The feedback I received from my advisor suggested adding some more functionality in order to provide more control for the users. So, I decided to add one potentiometer and three buttons which will allow the user to switch between different sounds and control some aspects of the sound quality.



Going Forward

For now, Hex is complete. However, like all my projects, I am constantly considering more additions from the resources I already have at hand. For instance, I am considering adding an accelerometer which measures the device's 9-axis orientation. The orientation can manipulate frequency or other audio effects, which will add an interesting interaction, which is unusual for a traditional drum.

Appendix C - LD1300 - *Loop*

Concept **Link to video**

LD1300 is a musical instrument made from repurposed materials that were discarded by their original owners. It is an electroacoustic instrument that, to produce sounds, it utilizes the audio feedback loop. It is designed to be easily reproduced and reimagine since it only requires common speakers at home, an amplifier, and two piezo sensors. It can be a little difficult to learn how to play this device, but the interface, which requires the player to move the sensors from one speaker to another, adds immersive interactivity.

Motivation

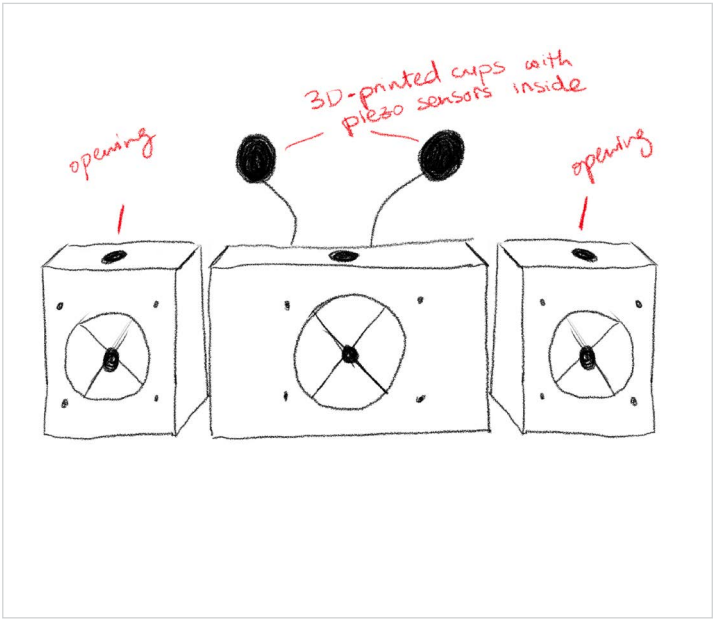
I wanted to create a device that is easily tinkered with at home with minimal complexity. One of the most common items I found discarded at waste centers, was old home theatres that no longer support modern technology like bluetooth or wifi. While these devices still work perfectly, their owners preferred to invest in newer models than to upgrade their existing one. So, for the third instrument, I decided to create something that inspires people to repurpose their home theatres when they decide that they no longer offer them a suffiecient functionality.

Activation

I am aiming for the activation to occur through demonstrating to the audience the ease and accessibility of LD1300. I believe that if a person in the audience has the parts, they have a good chance of trying this at home after its exhibition. The design and layout of LD1300 can be determined by the makers depending on the available resources and their preferences. Using feedback loop for musical purposes is not new, artists like Lesley Flanigan have been building instruments that use feedback loop to create beautiful sounds during live shows. (see video sample)

Design

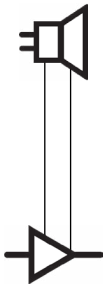
Most aspects of the LD1300 were discovered by coincidence through experiments that aim to expand my knowledge in audio instruments and input/output interactions. So, the design of the LD1300 was not much different. I was using some of the existng speakers to run some experiments on what kind of sounds I can produce using a piezo and speaker. After discovering the effects of the feedback loop, I decided to use the existing speaker cabinets because of their acoustic qualities and visual familiarity that is common in most homes. However, the focus of the design became to create an immersive interaction that goes beyond the tap of a drum pad or click of a button. For the LD1300 I wanted to create something that can exist infront of the audience, familiar in its aesthetics, unique in its interaction and sound production. While in the beginning I planned to build six speakers with different resonance qualities, placed in a half circle in front of the player. However, after completing three of the six, I decided to stick to three cabinets for now since it communicates the concept sufficiently. To house the two piezos, I experimented with two options, one that is 3D printed and the other made of wood. Since the 3D printed option offered less weight and less time to produce, I decided to go with that option.



Materials used

The LD1300 requires minimal resources and skills to replicate to redesign. It utilizes relatively easy technology and electrical components that are commonly found at home. To make the LD1300, I used medium-density fibreboard (MDF), which is a type of wood commonly used for speaker cabinets because of its vibration dampening qualities and durability. Although MDF does not offer the same reusability as plywood or other types of wood, its still widely available in discarded resources, which makes it a viable option to use while making repurposed devices. Also, in addition to the MDF wood, I used an already-built cabinet for an old subwoofer, which I decided to repurpose for this instrument.

Reused Electronics



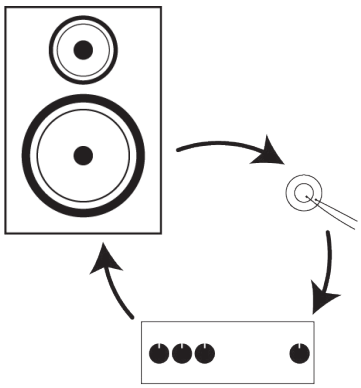
Speakers

In total, the LD1300 uses four speakers with different sizes and qualities. I used two subwoofers, which produce low-frequency audio signal and vibrations, and two higher-frequency speakers which produce a higher pitch.

Amplifier

I repurposed an old guitar amplifier with a single channel. The amplifier gives the player the control of bass, treble and gain, similar to the controls for an electric guitar. Coupled with the amplifier, I added a signal splitter to create a multi-channel audio output.

Feedback Loop



An audio feedback loop occurs when a sound loops between an audio input (piezo) and an audio output (speaker). The signal received by the piezo is amplified and sent back to the speaker, which is then again received by the piezo and amplified again. The frequency of the loop is affected by several factors like the resonance and distance between the components. Usually, feedback loop is avoided because of its squeaking loud sound, however, LD1300 demonstrates how feedback can be controlled and used as music.

Results

First Iteration

The first iteration of this device was completed and shared with the advisors. As I mentioned before, this iteration included only three speakers, which feedback suggests is enough. However, I will continue testing and experimenting with additional ideas in order to take this to the next step. Some of the feedback received was to create connectors that connect the speakers and stop them from moving while the players are interacting with them. Also, feedback suggests some instructions that can help the players get an idea of the interactivity and the type of sounds they can produce. I am in the process of creating a video reel for all of Liberated Debris instruments. The video will show the interactivity and some of the making process.

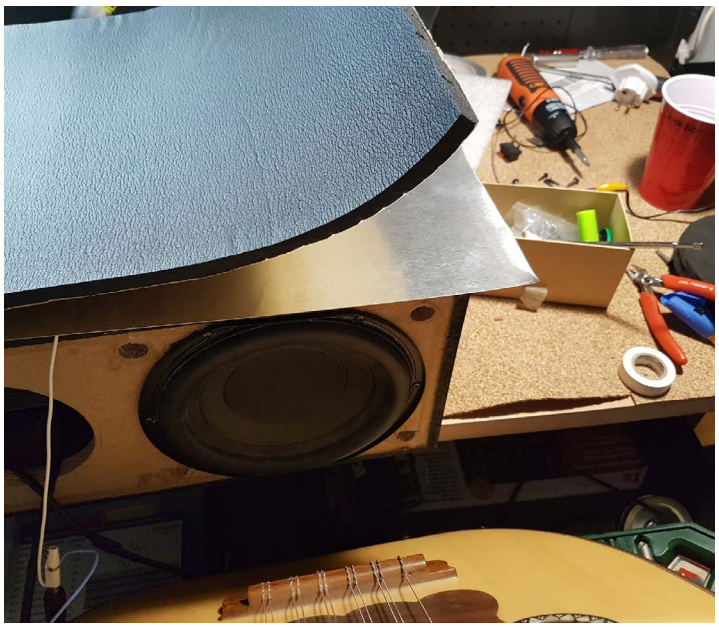
Going Forward

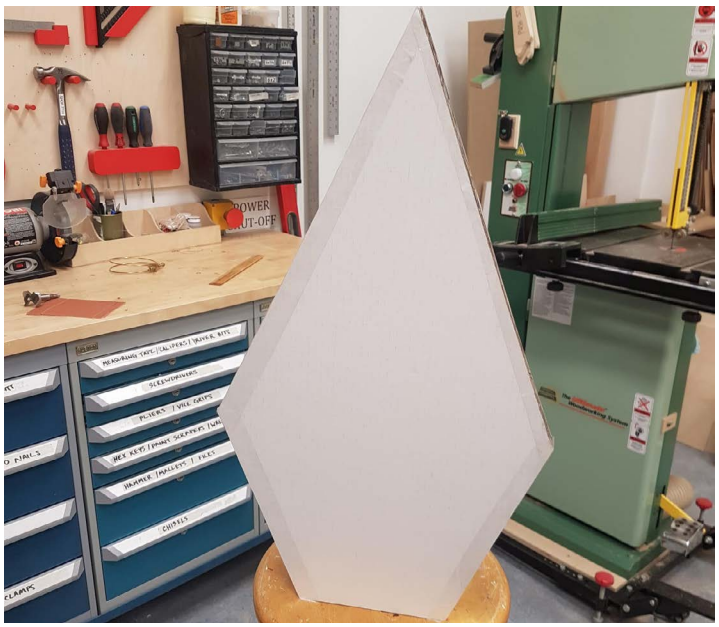
Going forward I intend to explore more functionalities that could be added to the instrument and resourced from repurposed materials. For example, adding smaller and more flat speakers can add an intersting audio effect. Also, I am exploring how the shape and size of the instrument can be adjusted to be smaller and accessible.

Appendix D - LD1400 - *Strings*

Concept **Link to video**

The LD1400 is inspired by Maurice Martenot's "Ondes Martenot" musical instrument. Created in 1928, after Martenot served as a radio operator during the war, it transformed military oscillating radio signals into music. Therefore, this instrument by itself is a demonstration of making's power and relevance in all occupations and backgrounds. Since the last Ondes Martenot instrument was created in 1988 (McNamee), this deems it an obsolete instrument which allows it to fall perfectly into the framework of this project. The LD1400 aims to bring to the audience's attention concepts like planned obsolescence and waste repurpose.





Motivation

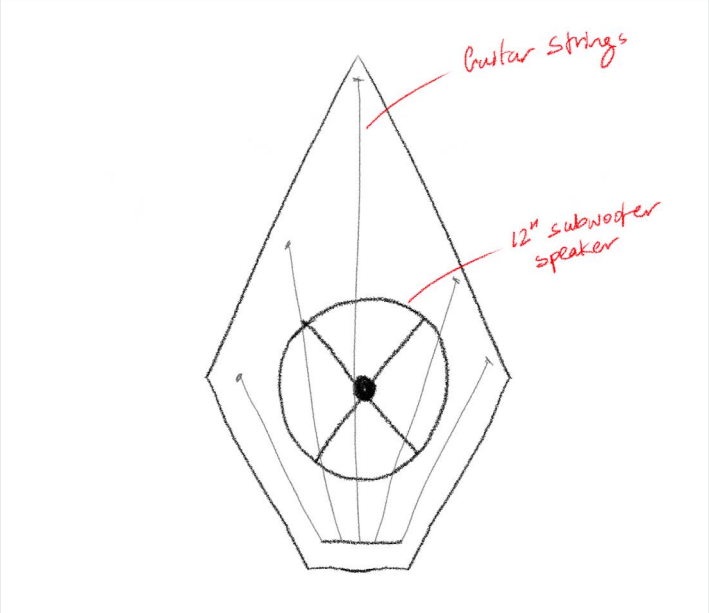
Since my discovery of the Ondes Martenot, I have been keen about attempting to make something that speaks to that curiousity. As an instrument, the LD1400 does not offer new technology, however, through its design and interactivity, I aim to produce a unique experience that reminds the audience of all the purposely obsolete devices that can still offer value today. As makers, we can breakthrough this limitation and bring back, whether as replicas or reinvention, any old and discontinued objects and devices.

Activation

Through the LD1400 I aim to trigger a sense of wonder in the audience that would trigger their curiousity and push them to ask questions. I believe the activation occurs when curiousity and feasibility meet, I aim to provide that meeting point for the audience.

Design

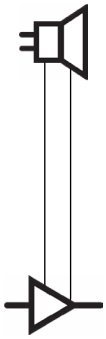
The design of LD1400 is based on one of the components of the Ondes Martenot instrument. Specifically, Martenot created that addition in order to add harmonic sounds to the music played on this instrument. I've been deeply intrigued by this instrument since I was introduced to it and I wanted to contribute to its revival in our memories and hopefully around the world. However, the original design is a round design that requires extensive tools and skills to recreate and use. So, in order to make LD1400 accessible by everyone, I decided to modify the design so that instead of round shapes, it uses straight lines and set angles. Using this approach, makers do not need access to heavy woodworking machinery and instead can cut these pieces and attach them using hand tools. In addition to the shape of the instrument, I am also working on creating an interface that allows the audience to interact with this instrument. However, I am still in my experimentation stage with a couple of options available to take it forward. More will be added soon.



Materials used

I am planning to use a combination of reused plywood and medium density fibreboard (MDF). The MDF will be used to build the body of the instrument and plywood will be used to create the front face, in order to make sure the weight is distributed and the instrument stands. Also, since MDF dampens vibration, I might be forced to reconsider this material and replace it with plywood through the device. In addition to the wood, I also repurposed used guitar strings. Also, since this device is still in building progress, there is a possibility that more materials will be added later depending on the result of the experiments and the sound created.

Reused electronics



Speaker

For LD1400, I used one 12-inch subwoofer speaker removed and reused from a discarded bass amplifier. While the amplifier was discarded by its owner because of incompatible power requirements between Canada (110V) and UAE (220V), the device itself and its components still work perfectly, which makes it a good candidate for this project.

Amplifier

I am still in the process of experimenting with different amplifiers and based on the results of those experiments I will be deciding on the type and size of amplifier required for this device. Ideally, I will be able to modify the existing amplifier to accept 110V, however, it will depend on the results of the experimentation with different amplifiers.

Results

First Iteration

Due to COVID-19 lockdown, I was unable to get access to the equipment needed to continue building this instrument. Therefore, the progress had to be postponed.

Appendix E - Instructions Manuals

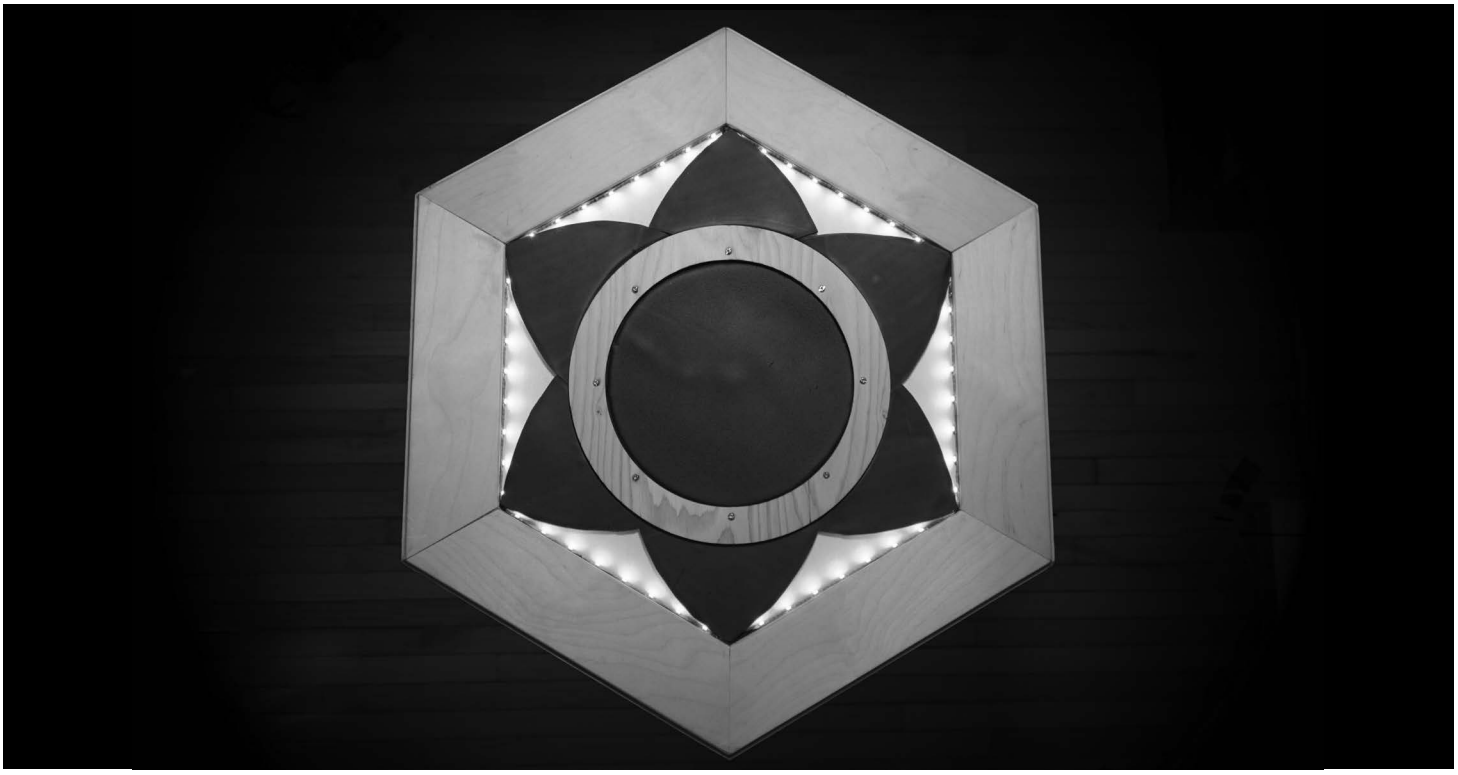
LD1100 - Roots

Instructions Manual

by

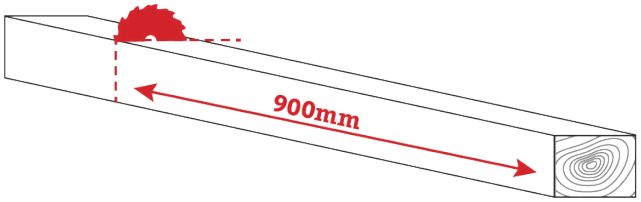
Mazin Chabayta

Link to photos & videos



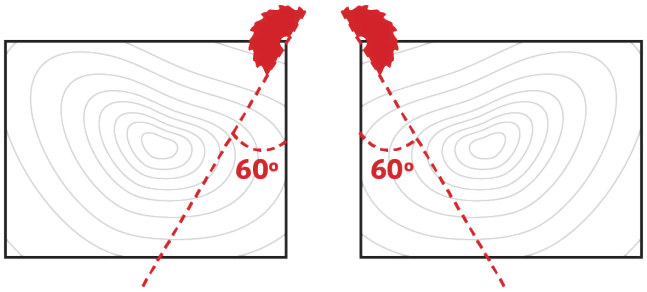
1. Cut the lumber for the frames

Repeat 12 times



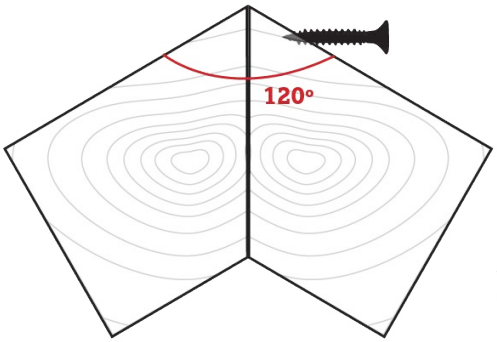
2. Cut the wood for the frames

Repeat 12 times



3. Attach to create a 60° corner

Repeat 6 times



wood screw

4. Cut the hexagon shelf

Repeat 3 times

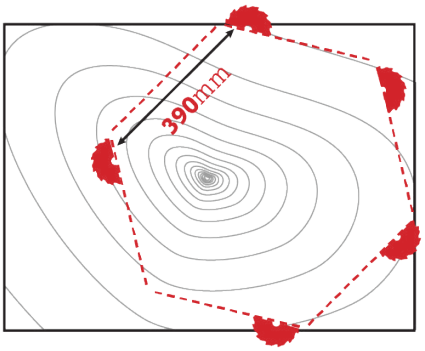
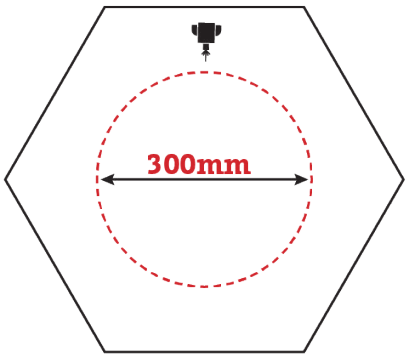


table saw

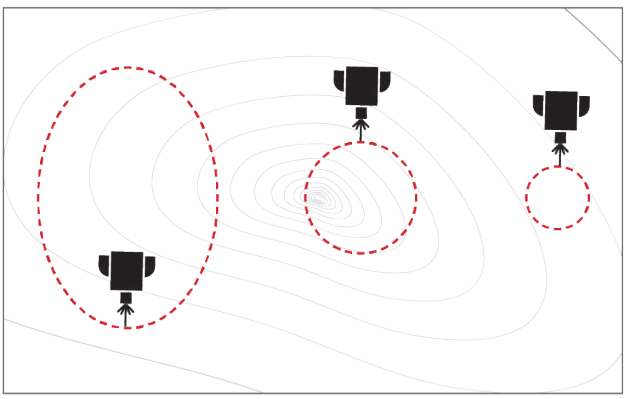
5. Cut the diameter of the sub



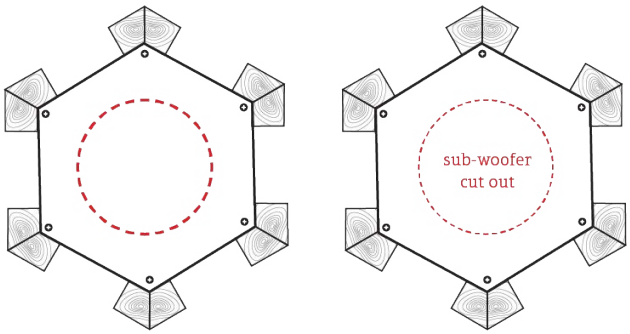
laser-cutting machine

6. Measure the diameter of each speaker, and make cut out

Repeat 2 times



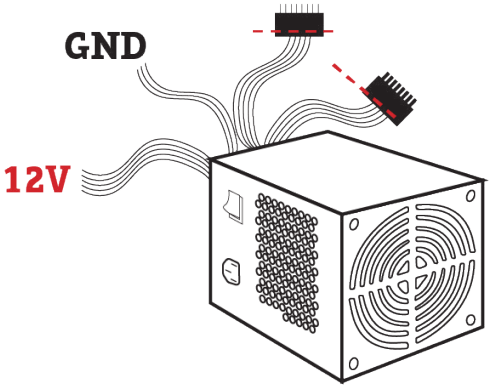
7. Assemble the frame legs to the top and buttom hex shelves



top view bottom view

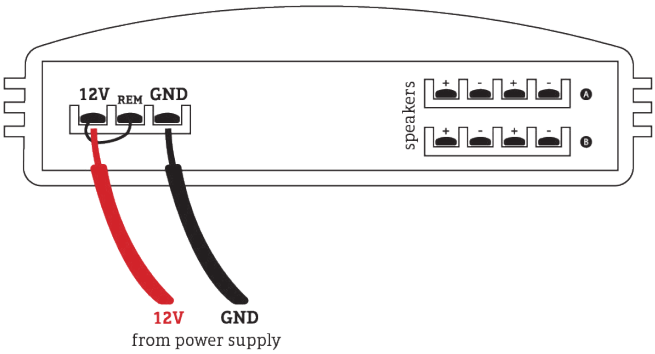
8. Identify the 12V & GND wires, remove the rest

Read the product's guide book before this step



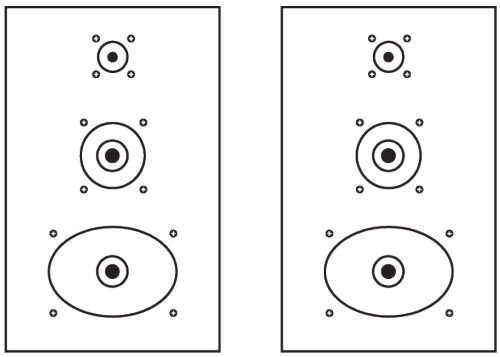
9. Connect 12V & GND to amplifier

Also connect the "REM" to the 12V

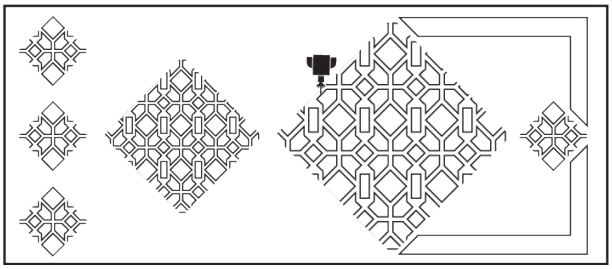


10. Mount speakers & subwoofer

The laser cuts should match the speakers' sizes

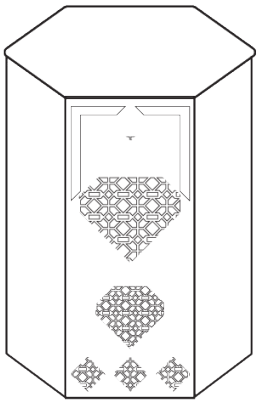


11. Laser cut the patterns on thin sheets of plywood



12. Measure the diameter of each speaker, and make cut out

Repeat 2 times



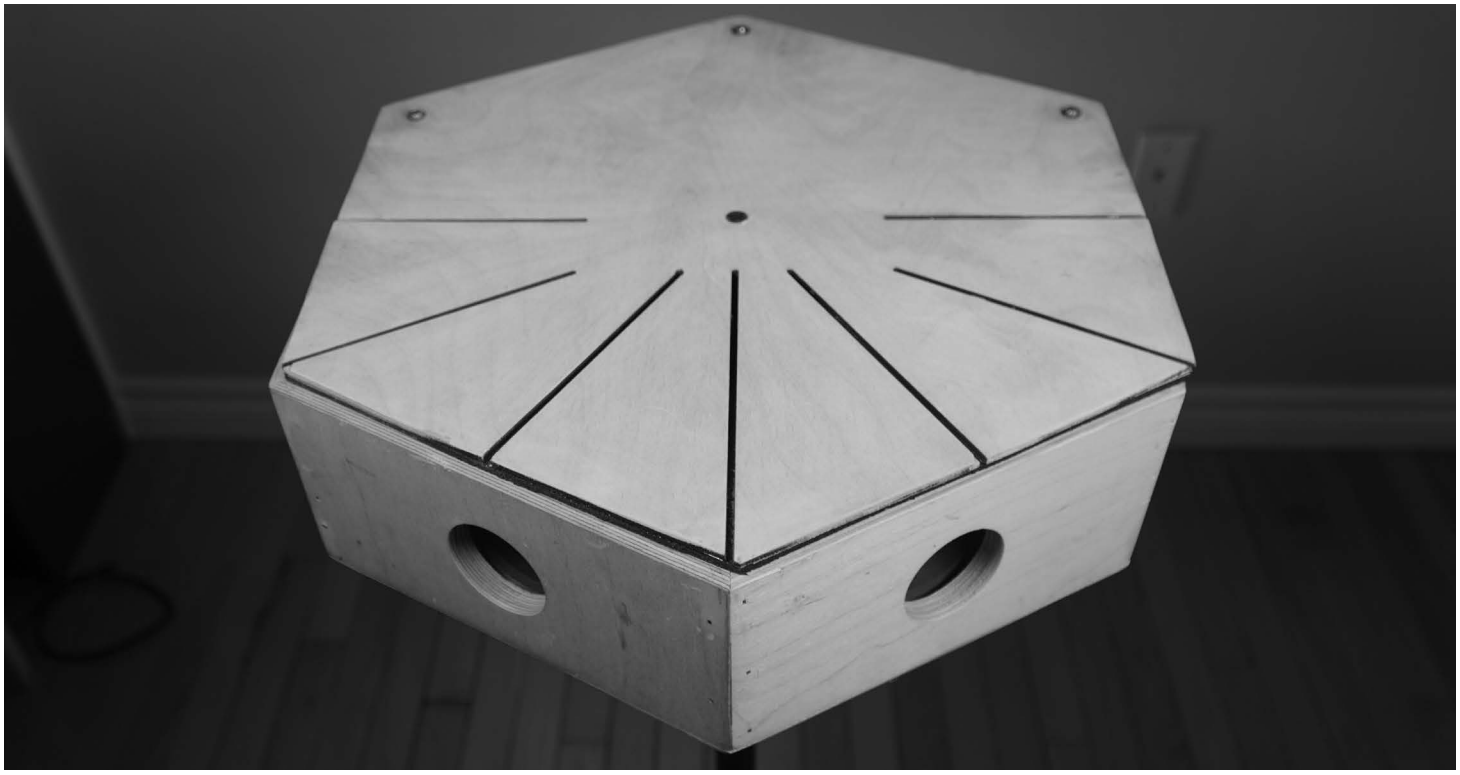
LD1200 - Hex

Instructions Manual

by

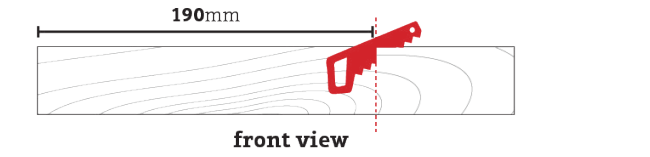
Mazin Chabayta

Link to photos & videos

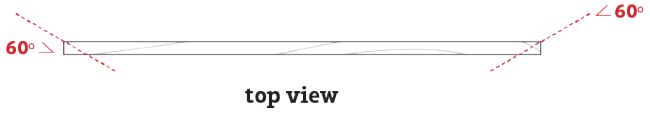


1. Cut the lumber for the frame

Repeat 6 times



front view

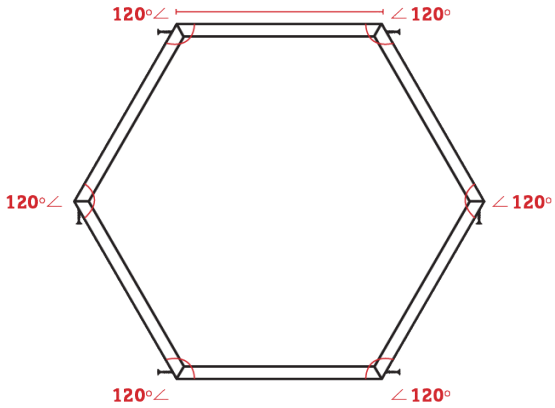


top view

hand saw

2. Attach the six sides to create the frame

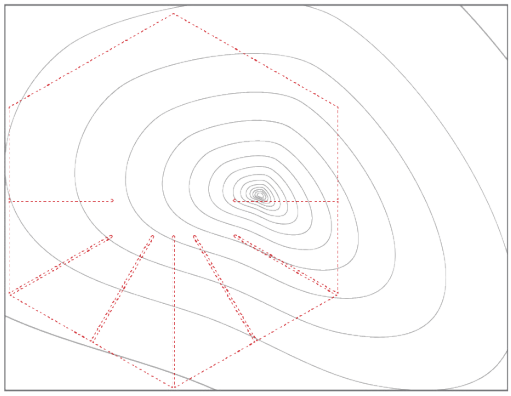
Make sure all the sides and angles are equal



wood screw

3. Cut the top cover of the frame

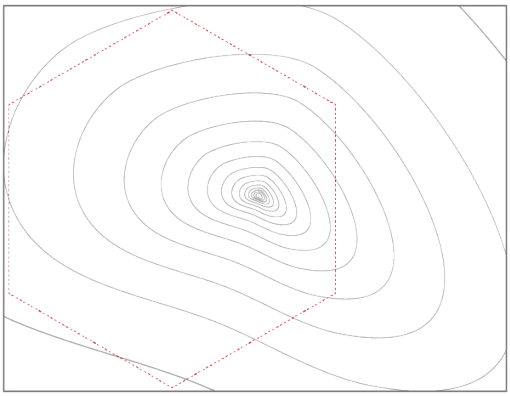
Link to file



laser-cutting

4. Cut the bottom cover of the frame

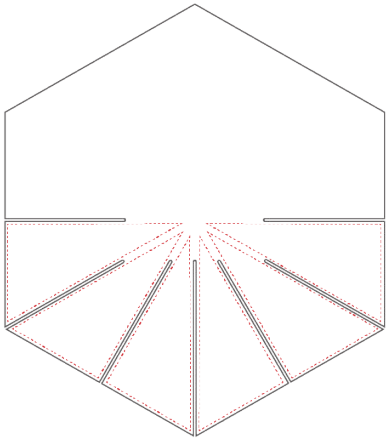
Link to file



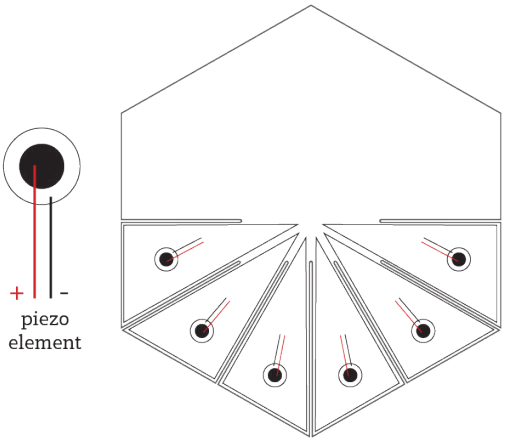
laser-cutting

5. Cut aluminum sheets and stick to inside of the top cover

Match the shapes of the wooden flaps



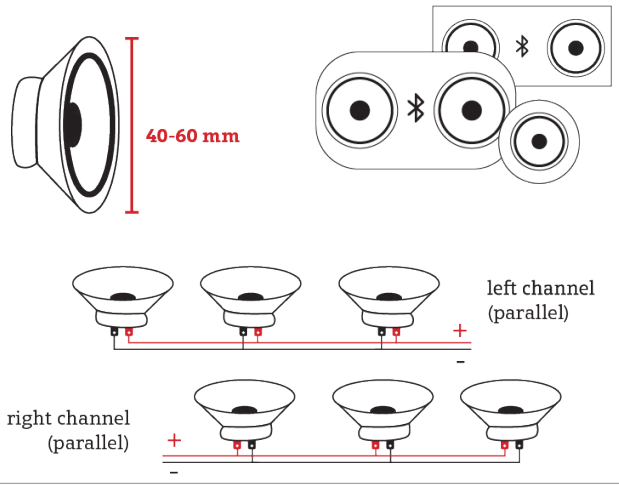
6. Glue the piezo elements onto each aluminum sheet



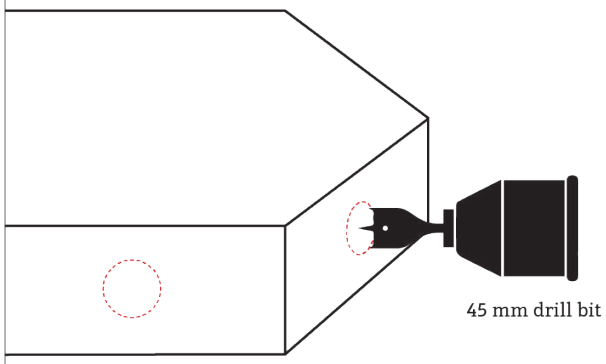
piezo element

7. Collect six speakers from available devices

Wire the speakers in parallel circuit

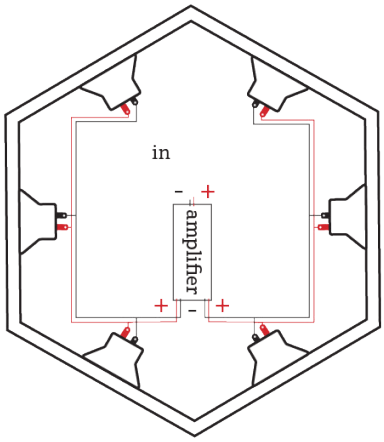


8. Using a drill bit, make a hole in the center of each side, this is where the speakers go



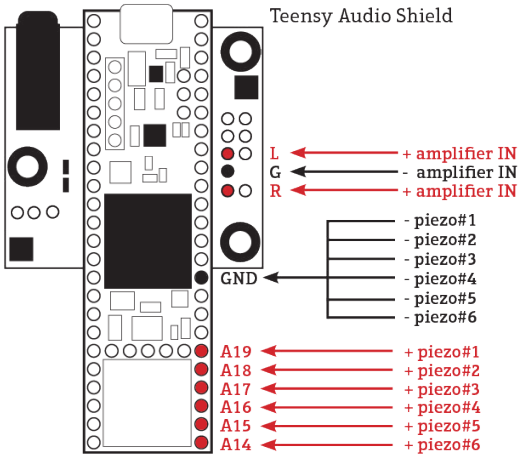
9. Mount speakers and connect each side to its matching side on the amplifier (optional)

Use any DC-powered amplifier



10. Teensy 3.6 and matching Audio Shield

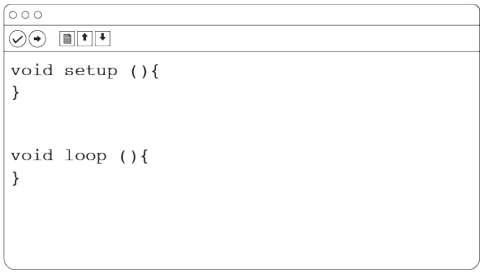
Connect electronic parts according to diagram



11. Go to freesounds.org and download size ".wav" sound files

12. Download code, and program the Teensy

Use Arduino software with Teensy upgrade



LD1300 - Loop

Instructions Manual

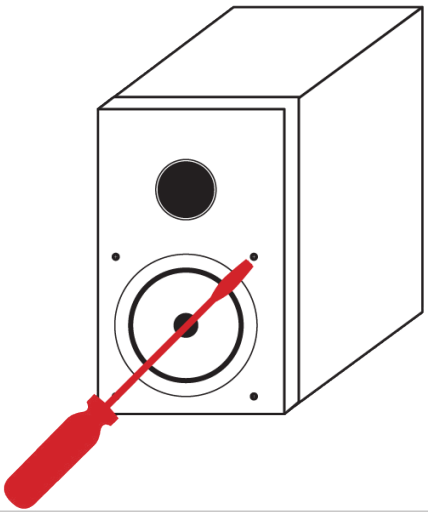
by

Mazin Chabayta

Link to photos & videos

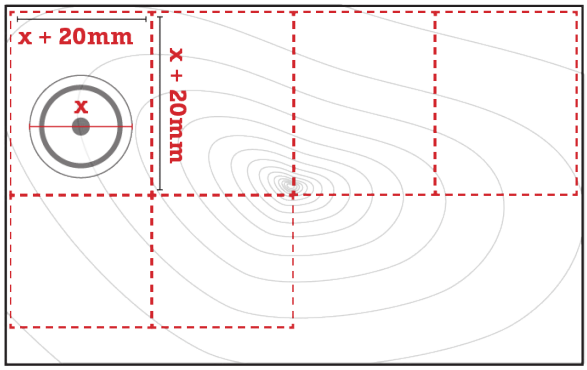
1. Remove speakers from their original box

Repeat as many times as needed



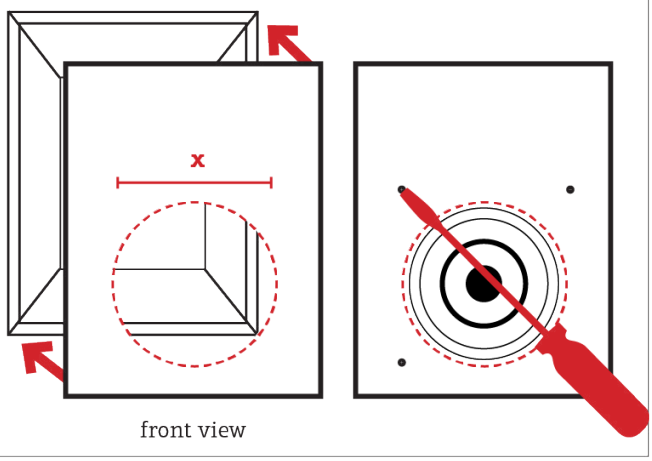
2. You can also cut some repurposed wood for additional boxes

Width and height are dependent on speaker size



3. Make hole(s) and attach the speakers to any side of the boxes

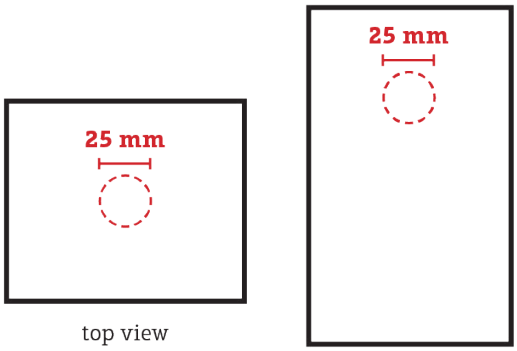
Repeat as many times as needed



front view

4. Make hole(s) on either side for the loop sensor

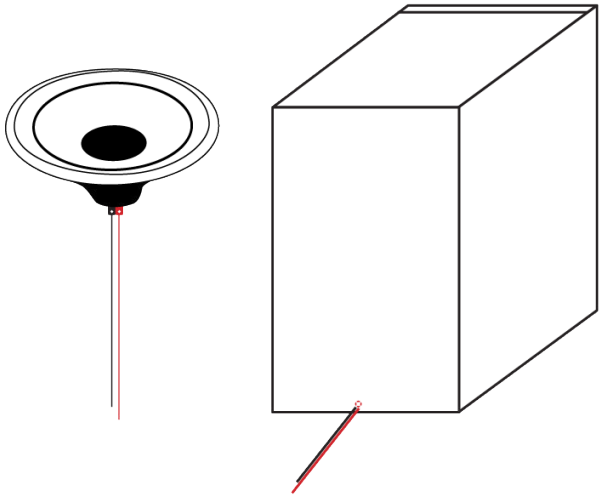
Repeat as many times as needed



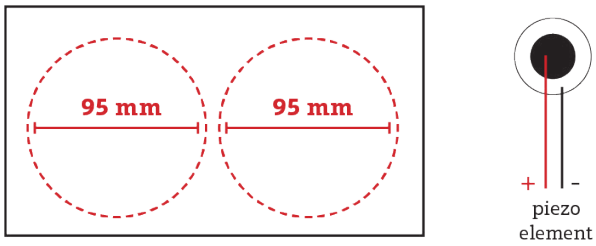
top view

side view

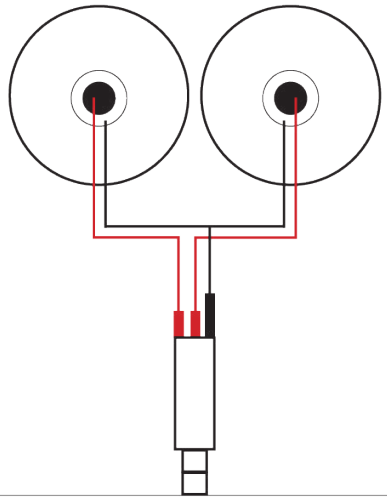
5. Cut the diameter of the sub



6. Cut two pieces of aluminum to create the handles that sense the loop

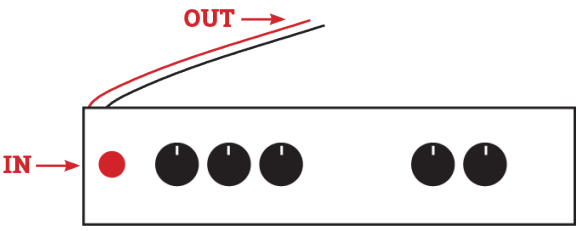


7. Attach piezo elements to the aluminum pieces and wire them to a stereo audio jack



8. Depending on the audio amplifier, the connections might change.

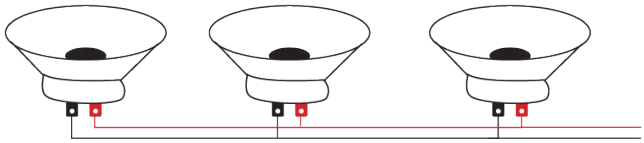
Identify the "IN" (receives signal) and "OUT" (transmits to speakers)



audio amplifier

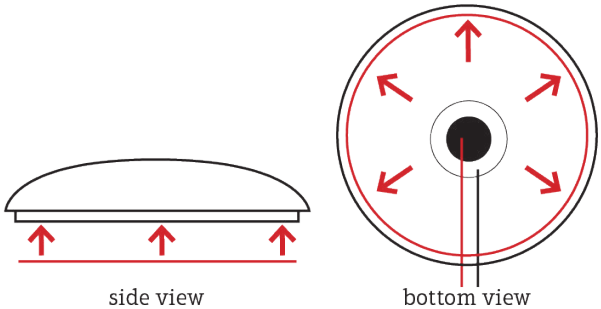
9. Wire speakers in parallel circuit

This is suitable if you choose to use a single channel amp



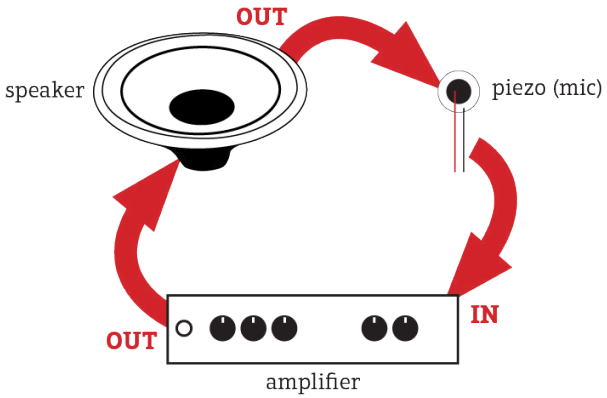
10. To download files, follow this link

Otherwise, you can create your own design. Insert aluminum pieces inside the handles.



side view bottom view

11. Feedback loop is a signal that continuously loops around the circuit, getting amplified with each loop



amplifier

LD1400 - Strings

Due to COVID-19 lockdown, completion of LD1400 - Strings was postponed.